

NOVEMBER 1995

INTERNETWORK SECURITY:

**Wake Up  
Before Your Worst  
Nightmare Happens**

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**What's Hot, What's Not**

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# HP Professional

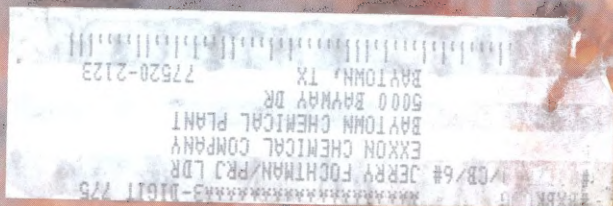
## DISASTER RECOVERY

**Because A Godzillian Things Could Go Wrong**

**SPECIAL SECTION**

**Mass Storage  
And Memory**

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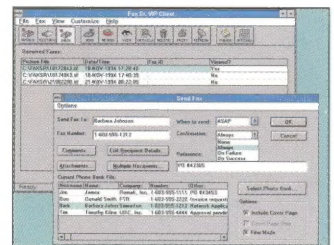
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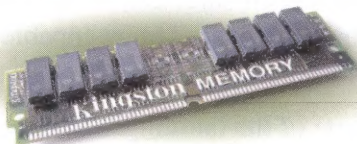


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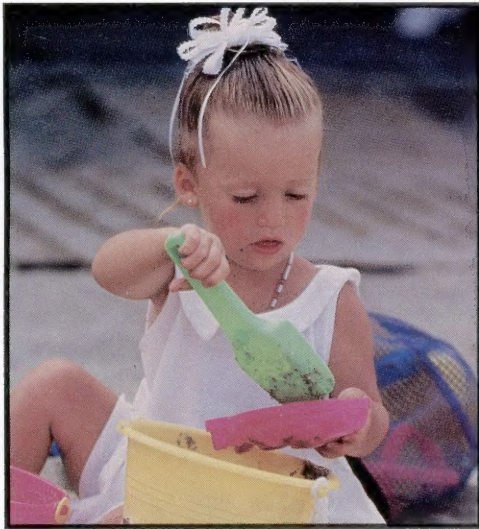
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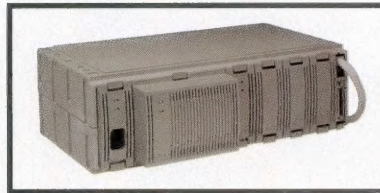
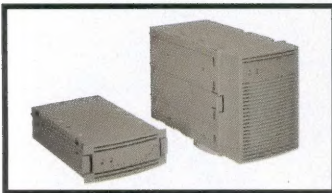
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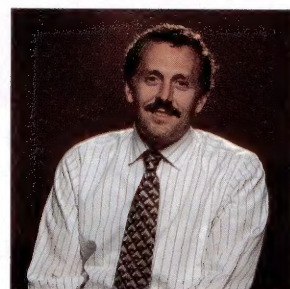
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**HP** Professional

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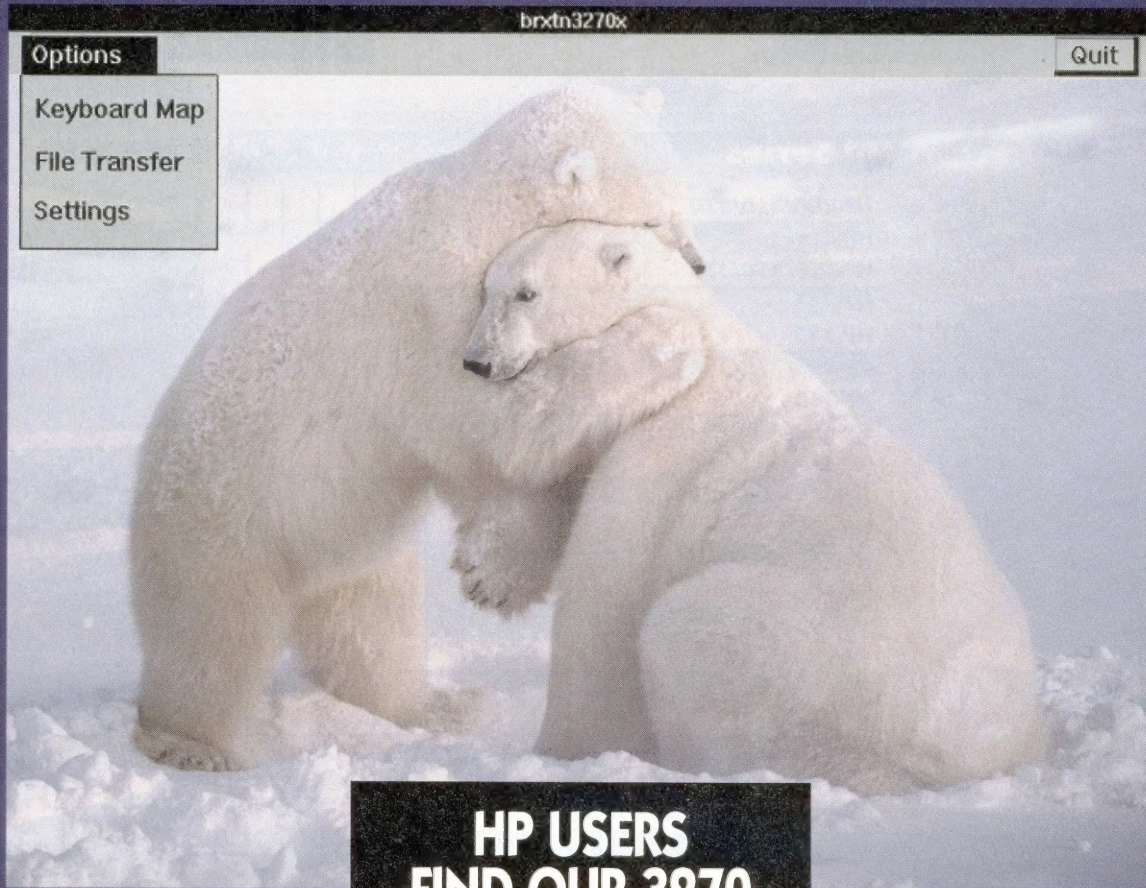
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# “If It Ain’t Broke, Fix It Anyway”

In August, HP announced some pretty important changes and promotions. Most eminent is Rick Belluzzo’s promotion to executive vice president, and head of HP’s Computer Organization. In an exclusive interview with *HP Professional*, Belluzzo shared his views and some preliminary strategies for HP’s computer organization.



**By Charlie  
Simpson**

**HP Professional:** What are some immediate challenges you face?

**Belluzzo:** The organization change that was made presents some unique opportunities for HP. If you think about the last five years, HP has had this focused organization structure that has worked on creating some very strong computer businesses — our support business, our systems business, as well as our product business.

The opportunity now is to continue with those focused organizations and yet, at the same time, work to bring together some of the core strengths that we’ve created in these individual businesses to be able to provide more leverage across some parts of the organization.

Some of those examples would include big corporate customers who look for a single company like HP to bring together client-server solutions, including our strong UNIX products, our PC and peripheral products, as well as our support and integration business. Customers want to look to one supplier to be able to bring that together in a fairly seamless manner. Today we have a little bit of difficulty doing that, although we have all of the strengths at hand to be able to make that happen.

The same is true in terms of taking some of our PC products and bringing those into a more mission-critical deployment that lots of customers are asking for today. Another example would include bringing some of the strengths in our Computer Products Organization to our Computer Systems Organization to improve the competitiveness.

So those represent some of the immediate challenges of basically bringing those pieces together in a way that allows them to continue to move our business forward, to continue with the momentum that we have and yet be able to a better job of meeting the needs of customers and be more effective at responding to the transitions that are occurring in the marketplace.

**HP Professional:** What experiences will you bring to the new position?

**Belluzzo:** What I bring to this business, hopefully, is the ability to get people together to solve complex problems. The opportunities we have are really significant, and yet they are very, very complicated; and I don’t intend to bring all the answers to these difficult situations. But I do hope to bring the leadership and the ability to get people to work together to define the strategies and execute the programs that will make us attain more in the future.

**HP Professional:** What lessons did you learn in previous positions that you will apply to your current responsibilities?

**Belluzzo:** What I’ve learned in the past is about leadership and focus — the desire to have a strategy that allows us to be a leader in the markets that we serve and the ability to focus around fewer markets rather than have the broad range of businesses. I want to make sure that what we choose to do, we do better than anyone else in the industry.

**HP Professional:** Are there plans for further major acquisitions, such as the Convex announcement?

**Belluzzo:** Acquisitions are always on our minds. We always think about how to use acquisitions

*(continued on page 9)*



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(continued from page 7)

to be able to balance our overall ability to serve a certain marketplace and be able to address the issues that we might face in competing in a particular marketplace. We're not doing acquisitions just to grow. We do acquisitions to add to our strengths and our product lines.

**HP Professional:** HP seems to be preparing to position itself as the de facto UNIX operating system with such alliances as the HP, Novell, SCO announcement. What does this mean to the industry?

**Belluzzo:** We do believe there will be consolidation in the industry and that by bringing UNIX technologies together, UNIX can be strong and the de facto standard. The recent announcement with Novell and SCO is an example of where we want to continue to consolidate UNIX and be able to be the leading UNIX supplier in that part of the marketplace.

**HP Professional:** So where does NT fit into the picture?

**Belluzzo:** NT, at the same time, is very important. We want to be THE open-systems company as we've been in the past. We hope to be able to move UNIX forward, but at the same time, many customers are asking for mixed environments. NT is an operating system that is gaining strength. We expect to play in that position, primarily with our NetServers and our ability to integrate those across the 9000 business, as well. There is, however, no plan to announce NT support on the 9000.

**HP Professional:** There appears to be a marketing and promotions budget cutback at HP. Is this perception accurate? And what areas of cost cutting can we expect?

**Belluzzo:** Our businesses are all pretty competitive today, and we intend to keep them competitive. That will require us to increase our productivity and always look for opportunities to ensure that our competitiveness matches the business model for the individual markets we serve.

**HP Professional:** Given your background, will there be more focus on PCs? And will there be an easing of the friction between the UNIX and PC groups in HP?

**Belluzzo:** The marketplace and customers determine our priorities. I believe that we are uniquely positioned in that we have a strong client-server business and understand that well with our UNIX business, and yet we also have a growing position in PCs. I think our latest data has us number 3 in the business or corporate marketplace with PCs; so we can uniquely contribute and we can bring those individual strengths together. We can look for ways to position HP as a better overall supplier. But we are not going to try to turn the UNIX business into the PC business, nor are we going to turn the PC business into the systems business. They are different, but we will always look for opportunities to leverage

the individual strengths and characteristics of both parts of the business for the good of HP.

**HP Professional:** What will your role be in the MC<sup>2</sup> program?

**Belluzzo:** I will continue to be a very strong advocate of looking for competitive advantages, always focusing on doing what makes sense for customers.

**HP Professional:** Where do you see HP in the next six months? In the next year?

**Belluzzo:** We have a good amount of momentum in the marketplace on all parts of our business. My objective is to continue that momentum and within six months to a year from now to look for some unique opportunities around the strengths of these individual businesses. So I hope we'll have a number of programs in place that will further strengthen our business and allow us to do a better job in the marketplace, responding to customer needs and taking advantage of our unique position.

**HP Professional:** What is the significance of your financial background versus a technical background in your new position?

**Belluzzo:** My financial background is old; I've been out of finance for well over 10 years. I feel

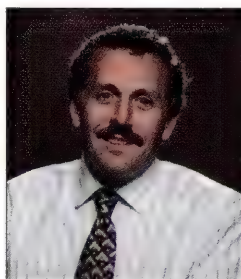
like one of the skills I have is the ability to bring business and technology together. I have always worked to understand the technology. While I'm not trained as an engineer, I hope I've been able to develop an aptitude for making technical decisions and making technical tradeoffs. I've tried to demonstrate that in my previous jobs and hope to do so in this job as well. So I don't think you're going to see a "run by the numbers" organization here. Although I do understand the numbers and do understand the business side of things, I will work to contribute in the technology area and to rely on those who know it much better than me, as well.

**HP Professional:** Finally, are you on the fast track to Lew Platt's job?

**Belluzzo:** No. I feel my new job is the biggest challenge of my career. It's a very, very tough job. The business is large. The challenges and opportunities are significant, and really, the furthest thing from my mind is Lew's job. He seems to be doing it fine. I have always focused on what I'm doing, and right now I definitely have my hands full. I'm really excited about it and really not even motivated to worry about the next level.

I'm excited about this opportunity. I think it's good for HP customers, and we're not going to completely revamp things, but are going to bring better integration and better solutions and better support to our customers.

*Charlie Simpson*



Rick Belluzzo,  
HP Executive VP



## INDUSTRY WATCH

George A. Thompson

## OH SAY CAN YOU "C"

HP continued to replenish its workstation product line this past October with the introduction of its C-class workstations. Models C100 (\$19,715) and C110 (\$25,715), based on 100



*SPECint92 and SPECfp92 benchmarks for the C100 are 136 and 245, respectively; and 167 and 269 for the C110. Both were running the HP-UX 10.0 OS.*

MHz and 120 MHz versions of HP's PA-7200 CPU, respectively, are desk-

top replacements for the older HP 9000/735 workstation. Both also are upgradeable to HP's forthcoming PA-8000 CPU. Intended to provide solutions in mechanical design automation (3D CAD), electronic design automation (ASIC design and analysis), GIS (terrain analysis) and medical diagnostic imaging solutions, the C100 and C110 can be configured with 17- or 20-inch monitors and a variety of HP graphics cards (Color Graphics Card, Dual Color Graphics Card; CRX-24, CRX-24Z, CRX-48Z; HCRX-8, HCRX-24, HCRX-8Z; VisualEyes-8, VisualEyes-24, VisualEyes-48).

The C-class workstations fall between HP current workstations Models HP 9000/712 and 715 at the low end and the *deskside* J-class workstations introduced this past June (see Industry Watch, June 1995). PLBsurf93 numbers range up to 200 for the Model C100 and up to 236 for the Model C110. According to George Gardner, workstation product manager, the C110 (\$44,500), configured with HP's

VisualEyes-48 graphics card, 64 MB RAM, 2 GB disk and 20-inch monitor, is more than price competitive with Silicon Graphics Indigo2 Max Impact (\$51,000) and is available now. "Although announced this past July, SGI is still not shipping a product," says Gardner. Jim Greene, analyst at Summit Strategies (Boston, Mass.) says "it's not a breakthrough product but it fills the gaps in product line." Greene, however, thinks that HP's drive into the medical imaging market is particularly noteworthy. "It makes a lot sense given their legacy in the medical instrument business." ●

## SOFTWARE PIRACY

According to the Business Software Alliance (BSA; Washington, D.C.), 22 injunctions were served against retailers in Hong Kong's Golden Shopping Arcade this past October. The Arcade is believed to be a major distribution outlet for illegal software produced in China. "The illegal software trade at the Golden Shopping Arcade has become so extensive that it now reached the point where it seriously threatens the future viability of software publishers and other legitimate businesses in the industry, not only here in Hong Kong, but throughout the region and around the world," says Valerie Colbourn, vice president of the BSA. ●

## HP STRATEGIC DIRECTIONS

On December 6, 1995, HP will offer *Hewlett-Packard Computing Directions: Strategies for Customer Success*, a live broadcast on future strategies. Users are invited to attend at HP sales offices in the United States, Canada and Mexico. For registration or satellite information, call (800) 333-7957. ●

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of the Institute of Management Accountants (IMA; Montvale, N.J.). According to the survey, almost one-third (30 percent)

of controllers report that their companies' hardware/software implementation projects were over budget by an average of 23

percent. Forty percent said that projects were completed behind schedule by an average of six months, while only 1 percent claimed that projects were completed early.

## WHERE'S THE FIRE?

According to most industry estimates, the Internet firewall market will increase 70 percent from \$1.1 billion in 1995 to \$16.2 billion in the year 2000. Yet according to Computer Security Institute (CSI; San Francisco, Calif.), 30 percent of breaches occur *after* a firewall is installed. And one out of every five Net sites has suffered a security breach.







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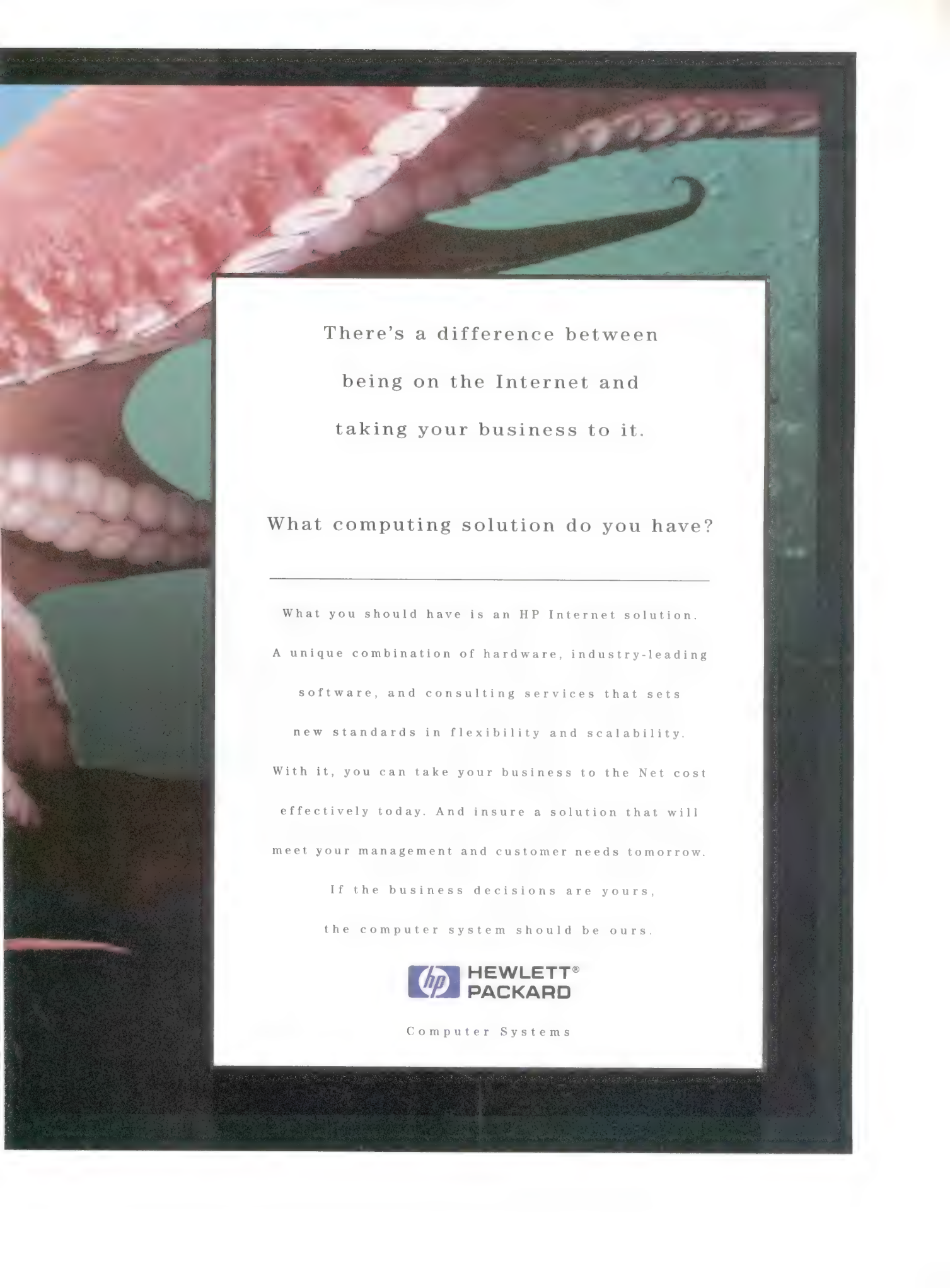




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Computer Systems



# JSB MultiView Lands Applications Safely At British Airways

In May 1990, while attending a trade show, Jonathan Martin, distributed systems specialist for British Airways, "stumbled across" JSB Computer Systems Ltd. (Congleton, Cheshire UK). This inauspicious first meeting resulted in the acquisition of products that enabled the seamless integration of PC workstations and UNIX minicomputers at British Airways. Five years later, according to Martin, "We haven't looked back yet."

Martin uses JSB MultiView Desktop and MultiView/X to connect over 1,500 workstations running Microsoft Windows and IBM OS/2 operating systems to an IBM RS/9000 UNIX mini-computer host.

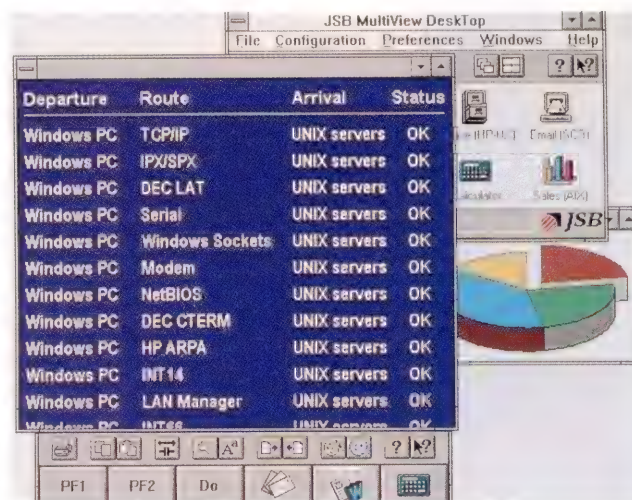
"Applications include our Baggage Handling System — the system we use to try to make sure that your luggage doesn't get lost in London-Heathrow Airport, financial applications, crew roster/scheduling systems and an in-house helpdesk. Both text and X Windows applications are supported using the JSB products."

JSB MultiView Desktop provides terminal emulation and PC-to-UNIX integration on a simple iconic desktop. The product may be used to add windows to remote applications without development costs. Full point-and-click mouse control and specialized keyboard mapping are supported. Additionally, the product supports direct serial and modem connections and most popular network protocols including TCP/IP, IPX/SPX and DECnet. With MultiView

Desktop, printers can be shared between UNIX and PC systems.

"With MultiView Desktop, we can hide everything from users. Our objective is to make everything simple. We want users to be able to perform useful work simply by clicking on an icon," says Martin. MultiView Desktop supports copy and paste between PC and remote applications, two-way

View/X delivers a full X11 Release 5 server to display graphical X applications under Windows. JSB maintains that the product provides a unique combination of character and X server functionality that reduces PC and UNIX host overhead. The product's 32-bit X Window server is optimized to use the Intel 386/486 instruction set.



JSB's MultiView Desktop.

Dynamic Data Exchange (DDE) between PC and UNIX systems, and offers a high performance network file transfer program (ftp) with a drag-and-drop interface. A Developer's API toolkit is available for low-cost, client-server development, and a Visual Basic Custom Control is available for developing graphical application front ends at no additional cost.

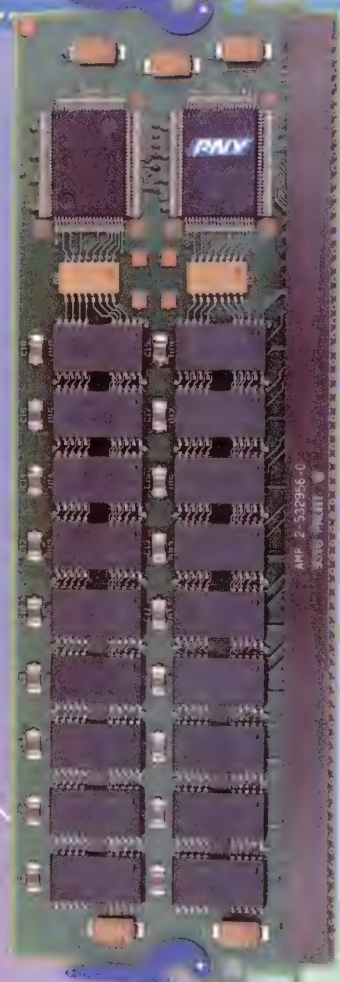
Martin also praises the JSB MultiView/X product. Multi-

Martin appreciates the practical advantage accrued to MultiView/X, "We were using a special terminal for one application that provided 30 line by 80 column resolution. It is very difficult to drive Windows in this special mode. Other companies told us it would require the installation of a special card in every PC. With MultiView, we had the desktop configured in ten seconds. It saved us a lot of money."

MultiView/X allows each X



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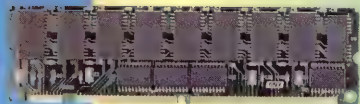
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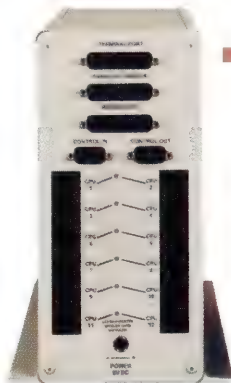
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client to be visualized within a separate window. In single-window mode, MultiView/X supports the use of remote window managers such as Motif, Open Look and DEC Windows. Virtual screen sizes of 32,767 x 32,767 are possible with a wide range of host-resident fonts available. The program supports 24-bit and 16-bit color and font scaling. The product is delivered with a PCF and BDF-to-FON format font compiler.

MultiView/X supports a wide range of connection options including HP ARPA Services for DOS and Microsoft LAN Manager, FTP PC/TCP, Sun PC-NFS, 3Com 3+Open TCP, Novell LAN Workplace and DEC Pathworks. The product's character server provides high performance access to character applications through a range of terminal emulators including DEC VT 100, VT 220, VT 241, VT 320, VT 420, SCO UNIX/Console, X/Open ANSI, INTERACTIVE UNIX Console, AT&T UNIX Console and Wyse 60.

According to Kevin Blakeman, general manager for JSB's U.S. subsidiary, JSB Corp. (Scotts Valley, Calif.), MultiView Desktop and MultiView/X are capitalizing on several trends in the business computing market. "We are seeing UNIX systems growing at a steady rate both in Europe and in the U.S. At the same time, we are seeing the decline of dumb terminals. The third trend is the increasing connectivity of PCs to TCP/IP networks, the networking choice for UNIX. Finally, according to the Gartner Group, Microsoft Windows is on 64 million PCs and this number is growing at 2 million per month. Our position, in light of these trends is that companies will need MultiView Desktop and MultiView/X to integrate their PCs with their UNIX systems." Jonathan Martin adds, "The product is very solid. We are constantly finding use for it in other projects."

JSB Corp. is located at 108 Whispering Pines Dr., Scotts Valley, Calif. 95066; (408) 438-8300.

—Jon William Toigo,  
Contributing Author





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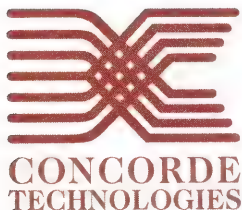
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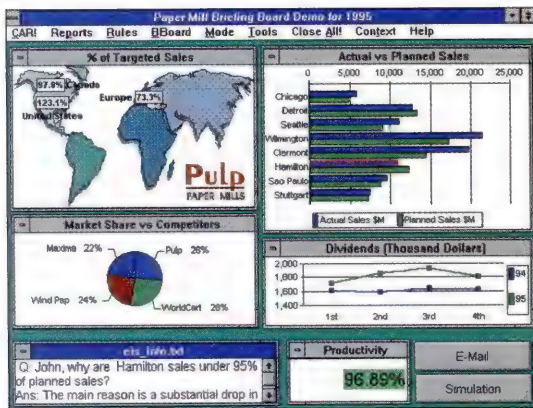
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# Speedware's New Media For Data Analysis



## MEDIA VERSION 2.4

- ▶ Client interacts with users, queries and evaluates rules
- ▶ The Matrix System evaluates Media queries and carries out necessary transformations on .dat files
- ▶ Compatible with Windows 3.1 and UNIX platforms

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In business today, data warehousing provides a reliable way for companies to store information. But this is not enough. Companies still need an effective way to analyze that data. To bridge this gap, Speedware Corp. (Toronto, Ontario) offers Media, a PC-based EIS tool that allows non-technical users to create full-color, custom reports.

According to Joel Buxton, IT engineer with the Management Support Lab in HP's IT department (Atlanta, Ga.), he originally discovered Media about four years ago, and chose to use it because of its end user flexibility and ease of development.

Using Media, and without technical assistance, managers can make ad hoc queries to interrogate, investigate and analyze data in a number of

ways. And, its point-and-click interface lets users tap into the database for information and drill down to detailed reports.

Traditionally, data was centrally managed to insure coherence, but its formatting was decentralized to guarantee flexibility for the user. Version 2.4 is aimed at large or very decentralized corporations where headquarters could benefit from the easy integration of information from various groups, such as business units located on different continents. Version 2.4 also facilitates the standardization of information to allow comparisons to be made.

Managing data implies two processes: defining the information and loading the values. Version 2.4 is able to extract from the lowest levels the values required by the higher level, so that it is only necessary to carry out the loading process once.

Media's modules have been divided into the client and the matrix system (server). The client depends on the module that is used — Media, EditDict or the Loader — but always interacts with users, queries and evaluates rules. The Matrix System evaluates Media queries and carries out necessary transformations on .dat files, such as calculating contours, updating and restructuring. The module installed on the client's PC

allows it to operate in client-server or file-sharing mode. Currently, Buxton has upwards of 1,000 users on solutions that use Media as a display. About 99 percent of those are running the Media client on Windows 3.1-based PCs, as well as a few using Windows NT. And, he has an HP 9000/887 as Media's file and applications server.

Version 2.4 offers a UNIX module that exploits the processing speed of minicomputers and distributed corporate management. This feature permits improved information flow and analysis between company offices in diverse geographic locations. "We have a few applications that are running in non-client-server mode," Buxton says, "but generally the information is stored on the HP 9000 and the number crunching is done on the PCs."

Media dynamically decides on the operating mode depending on whether the dictionary name being used is a valid file name or whether it starts with the name of a server machine. It will access it via the local file mechanism or the client-server one.

Also, it is no longer necessary to transfer the input file from the UNIX machine to the PC.

—Deborah Schwartz,  
Assistant Editor





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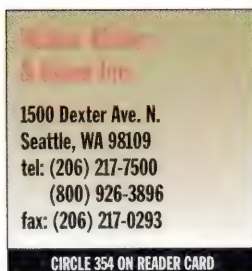
# How Suite It Is

## WRQ Expands Into The Asia Pacific Region.



"As WRQ moves and grows, it is the HP community that fuels the growth, and relations with that community will remain at the core of our strategies."

**Kevin Klustner**  
Vice President of Sales  
and Marketing  
Walker Richer & Quinn



Over the years, Seattle has given us classic innovators such as Jimi Hendrix. It even claims to be the birth place of the grunge look. Now, the realm of high tech Seattle brings us Walker Richer & Quinn Inc. (WRQ; Seattle, Wash.). And if any company typifies a corporate trend setter, it's WRQ.

WRQ is one of today's rising stars of the software industry. In fact, the 500 employee company placed 75th in *Washington CEO Magazine's* top 150 private industries, and SoftLetter has ranked them number 16. The privately owned WRQ finished 1994 with \$89 million in sales according to Kevin Klustner, vice president of sales and marketing.

For those few who aren't yet familiar with WRQ, the company makes PC software that connects PC users to the enterprise and networks. It offers its Reflection series for HP, IBM, DEC and UNIX hosts. It also provides TCP/IP connectivity and products for the X Windows system. And according to Klustner, this fall sees the "culmination of WRQ's product line development." As other companies combine products into suite and mega-suite offerings, WRQ once again takes an innovative approach with Reflection SelectSuite, a cus-

tomized "universal client" that lets you choose the Reflection connectivity products you need for access across the enterprise.

SelectSuite lets you buy any combination of two or more Reflection PC-to-host software for HP, DEC, IBM, X and UNIX, along with software from the Reflection Network Series for each of your workstations. Pricing depends on the number of products purchased.

Changes in the industry have been reflected in how WRQ has grown. Seven years ago, 100 percent of the firm's revenues came from the HP 3000 market. Today, however, it's "HP-UX that has fueled the growth," says Klustner. And although "it is not a specific goal," the strength of HP and WRQ's relationship also is growing with the OpenView announcement in which HP will distribute Reflection 1 and NS Open with OpenView System Manager. In addition, Klustner points out relationships with AT&T in the wireless world and Reflection X on the PowerPC chip.

Now that WRQ has expanded its presence within the various market segments, it is looking for a broader worldwide presence. So this month, in addition to its recent office openings in Germany and France, WRQ opens its first

service and support office in the Asia-Pacific region located in Singapore.

"There are technological issues in Asia Pacific. Our big problem has been our ability to support double-byte character sets, in order to deliver the 16 bits needed to display a character," says Klustner. So this last summer and fall, WRQ rolled out double-byte support for Reflection Windows and X. The target markets, in addition to Singapore will be Japan, Hong Kong, China, Taiwan and Korea.

To keep up-to-date with the changes and with what customers want, WRQ has a tech support team (available at no cost for the life of the product) that fields over 5,000 calls per week. In addition, they sponsor user panels and distribution channel meetings. Some issues IS managers face include security, updates and upgrades, bulletproof connections and the cost of operation. "The days of the glass house are gone," maintains Klustner. "Managers now face 5,000 PCs scattered throughout the world. This is an incredible challenge and WRQ will help meet the challenge of corporations through industrial applications."

*Charlie Simpson,*  
Editor-in-Chief



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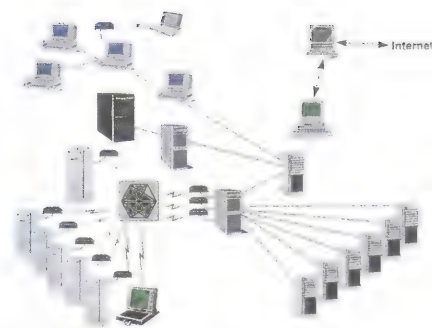
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# Corporate Networks And The Internet:

# a Question Of Security





**it** may come as no surprise that, at the recent Networld+Interop '95 show in Atlanta, Ga., the key motivator for many attendees was the quest for low-cost, high-availability access to the Internet for their corporate systems and networks. Enthusiasm for the commercial uses of the Internet continues to run high as tens of thousands of companies go on line each month.

Second only to this motivator was the fear and dread of what risks such a connection posed. Against the backdrop of optimism regarding the business uses of the World Wide Web is the sobering realization that connecting a business to the Internet entails substantial security risks. Businesses are concerned that opening a doorway from their secure, internal systems and networks to the unsecured public network may be exposing their mission critical automation assets to prying, abuse, even sabotage by unauthorized outsiders.

Expectedly then, vendors displayed access products and services on one side of their booth, while hawking security products on the other. Booth personnel tried to strike a balance in the prospective customer's mind

between the simplicity and useability of their products and their robustness against misuse.

HP chose the Fall trade show to launch its own Internet service offering. According to Jan Silverman, HP's director of Internet Solutions and host of the Internet Launch event held at the High Museum in Atlanta, the company's knowledge and experience in the realm of net-to-Internet connectivity is one of the industry's "best kept secrets."

"We have been helping Fortune 1000s get onto the Internet for several years with platform and software solutions and with consulting," Silverman also cited HP's own extensive history with managing one of the largest private networks in the world — its own — and the connections between its corporate net and the Internet. The company will leverage this experience, according to Silverman, to become a one-stop shop for its customers looking to establish a business presence on the Web.

Silverman concedes, however, that easy-to-use Web page authoring tools, browsers and electronic commerce solutions are not the complete solution for a business wishing to establish an Internet presence. "Security concerns are paramount. A business must be convinced that its Web presence is secure before it will give much play to the Internet. We know our servers and how secure our operating systems can

be, but the industry has lots of additional security-related products and we want to make sure that they are supported by Hewlett-Packard."

At the launch, HP announced a number of channel partnerships in the realm of internetwork security. Pre-eminent among them were Network Systems Corporation (Minneapolis, Minn.), Raptor Systems Inc. (Waltham, Mass.), Sterling Software (Dallas, Texas), Trusted Information Systems Inc. (Glenwood, Md.), CheckPoint Software Technologies (Lexington, Mass.) and SecureWare (Atlanta, Ga.). Says Silverman, "Our philosophy is to bundle a list of supported, high-profile, products, put a wrapper around it, and make it available to order on any Hewlett-Packard platform."

## SHRINK WRAP SECURITY?

THE APPROACH adopted by HP will no doubt be emulated by other large host product vendors. The reason? The sensitivity of businesses to the security risks of doing business on the Internet have risen over the past three years.

Several highly publicized hacker attacks have been waged against company networks via the Internet since 1994. As a result, business networking vocabularies now include terms such as "spoofing" — the impersonation of a local IP address to trick internal systems into accepting connections without pass-

*By Jon William Toigo*



curity



## Security

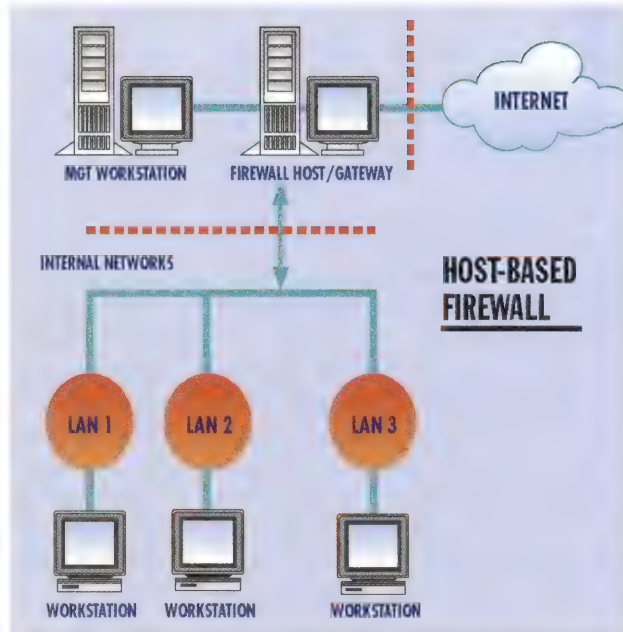
word verification — and “hijacked session attack” — the obtaining of root access in a UNIX system, enabling the hacker to modify the UNIX kernel and commandeer existing terminal or log-in connections.

In addition to the techniques of the hackers, network managers have also become familiar with the “forces of good” on the Net: the U.S. Department of Energy’s Computer Incident Advisory Capability (CIAC) at Lawrence Livermore National Laboratory (Livermore, Calif.) and the Pentagon-funded Computer Emergency Response Team at Carnegie Mellon University (CERT; Pittsburgh, Pa.). However, the clear message from these organizations is that less than 5 percent of hacker attacks are ever detected, and of those that are, few evil-doers are ever brought to justice.

Indeed, the primary mission of these organizations is not to detect, investigate and punish, but to determine what techniques have been used and what

can be done to prevent their reuse. CERT reports that security incidents increased by 76 percent in 1994 and a greater increase is expected when 1995 events are tallied.

One reason for the increase is that hackers have access to each other’s knowledge and skills through underground bulletin boards and are able to leverage collective “toolkits” to mount attacks on companies configured with familiar security products. In the words of one knowledgeable observer, “Hacker knowledge is now encapsulated into the shrink-wrapped computer programs, such as password sniffers.”



Contending with this threat requires the shrink-wrapping of the collective knowledge and skills of security vendors and their product engineers. This approach, signalled by HP in Atlanta,

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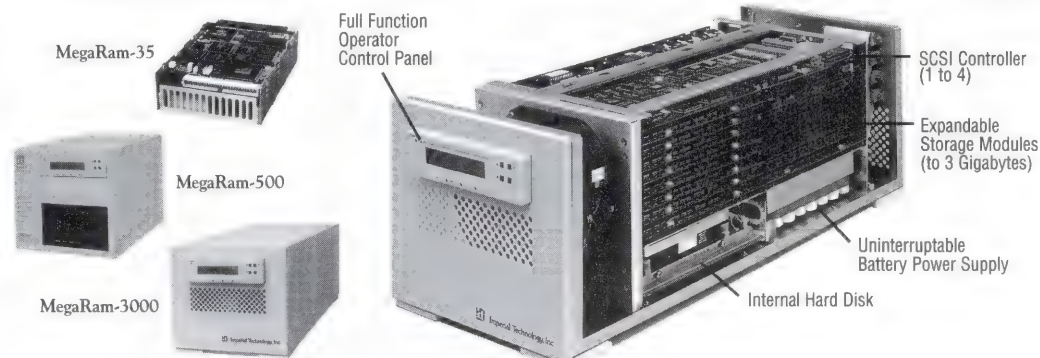
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will likely find adoption throughout the industry.

## STRATEGIES AND PRODUCTS

THE SHRINK-wrapping of security entails the integration of a number of security philosophies and methods in a manner that is consistent with corporate threat perception. Some companies are concerned about the divulgence of trade secrets or other privileged information to competitors or unauthorized users. For other businesses, the primary concern is the malicious behavior of hackers once they have broken into corporate networks and systems.

Companies that place a priority on preventing the theft of sensitive data may emphasize authentication and encryption in their security scheme, while those that fear viruses or other forms of cyber-vandalism may focus on securing access methods. Either way, a broad range of solutions are available to meet varying company needs.

Matthew Howard, security products manager for Cisco Systems (San Jose, Calif.), identifies the strategy of fire-walling as one fundamental building block of effective IP internetwork security regardless of threat, "Routers can be configured to serve as inexpensive firewalls and to restrict access to internal company networks and hosts."

Howard describes a process called packet-filtering that is routinely performed by routers and may be harnessed to prevent access to internal networks from unauthorized sources. Packet-filtering firewalls use a set of rules to define which packets — identified by their source and destination addresses and application port numbers — are to be passed through a router and which are dropped or returned to sender. Security is provided by prohibiting the establishment of a connection or the transfer of data across the router via these filtering rules.

According to Howard, two routers installed in tandem can create a double-blind, so that one router receives communications from the outside network but does not transfer them to the internal network or systems. Instead, the

second router retrieves the packets from the first, and using additional filtering rules, delivers them to their destination. This configuration is increasingly preferred by companies who fear that a single router may be a window to the internal networks — providing hackers with a monitoring point where they can collect user passwords.

Michael Grandinetti, director of marketing for Raptor Systems, agrees that

packet filtering using routers is one approach to securing access to corporate networks and systems, but adds, "Companies also need to have an application level gateway for robustness.

"Packet filters let packets pass through unless they are forbidden. An application level gateway forbids all packets except for those that are allowed. Moreover, the gateway can provide better audit information and

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## Security

provide management support. Packet filters don't provide user authentication on the basis of time of day, host, target, and protocol used, nor can they provide application specific controls such as restrictions by application for things like file transfers."

Raptor's products, workstation-based firewalling gateways, are positioned as a hybrid technology, arranged on a security spectrum as more secure than router-based packet filtering and less secure than the option of no Internet access. To companies like Bell Northern Research (BNR), an Ottawa, Ontario-based venture of Northern Telecom and Bell Canada, the security afforded by the Raptor Eagle solution is appropriate to perceived risks.

Marcus Leech, security architect for BNR, describes the security requirements for his company, "We design telecommunications equipment — central office switches and office systems. Our internal network is extensive, with over 100,000 addressable nodes. We use it to exchange design docs and to conduct research projects with a lot of on-line interaction. We also encourage our users to access the information databases on the World Wide Web. And we use the Internet extensively for E-mail and web browsing. Our primary concern is industrial espionage and hackers."

Leech explains that the company deployed Raptor products only after an extensive internal policy review, "We developed internal policies restricting employee access to the Internet and providing guidelines for what they can and can't do online. Users must fill out a document, indicate their business use for the Internet, and agree to certain rules regarding E-mail, file transfers and personal security."

Leech feels that policies are an important component of effective security, "Our user population has to be informed about secure operating practices or none of the other security products we install will work."

BNR's examination ran the gamut from packet filtering routers, to "true" firewalls offering encryption and control over file transfers, to application-level gateways and finally secure operating systems.

"We needed a product that would secure the data link layer in the network and prevent sniffing. With the Raptor host-based firewall application we had total control over packet flow. We could also hide the addresses of our subnet structures so that we look like we have a small number of IP addresses."

IP address hiding and packet filtering alone did not sell Raptor, however, according to Leech, "Raptor also provided appropriate authentication in the application layer. For example, anyone using telnet or ftp has to provide his or her username. Absolutely no one from the outside has access, except through E-mail." Raptor products also offer periodic random self-checks.

### CUSTOMIZING A SOLUTION

LEECH AND OTHERS are quick to point out that there is probably no single "shrink-wrapped security solution" that will meet everyone's needs. He views Raptor technology, applied in connection with his company's security concerns and user awareness level, as appropriate for BNR. Other companies or units within companies, according to Bruce Spence, information technology risk management specialist within HP, "have different needs for which other solutions may be appropriate."

One important difference is corporate philosophy, according to Spence. Many firms consider their data so sensitive that they do not trust their internal users. "In Hewlett-Packard

itself, the corporate philosophy is one of trust. We regard some security issues as standards, such as compromise of our Internet access or unauthorized access to Hewlett-Packard through modems, telephone systems, or other publicly-accessible points. But there is a balance that needs to be struck between system integrity and security and application and information availability. We use education and policy as the first line of defense, then apply other mechanisms as they are appropriate."

This same philosophy of customized security is what HP will be offering to its clients, according to Silverman, "We will recommend a flexible, independent solution based on the customer's application."

Keys to the selection of appropriate security measures include cost, compatibility, availability and integrity. Silverman indicates that HP is developing a matrix that will be made available to its customers to assist in defining the right mix of security products based on these factors and others.

With the combination of the engineering and expertise of multiple security product vendors, hackers may find the world of Internet a bit less vulnerable and a lot less user friendly — *Jon William Toigo, is an independent writer and consultant specializing in the Internet and network security issues.*

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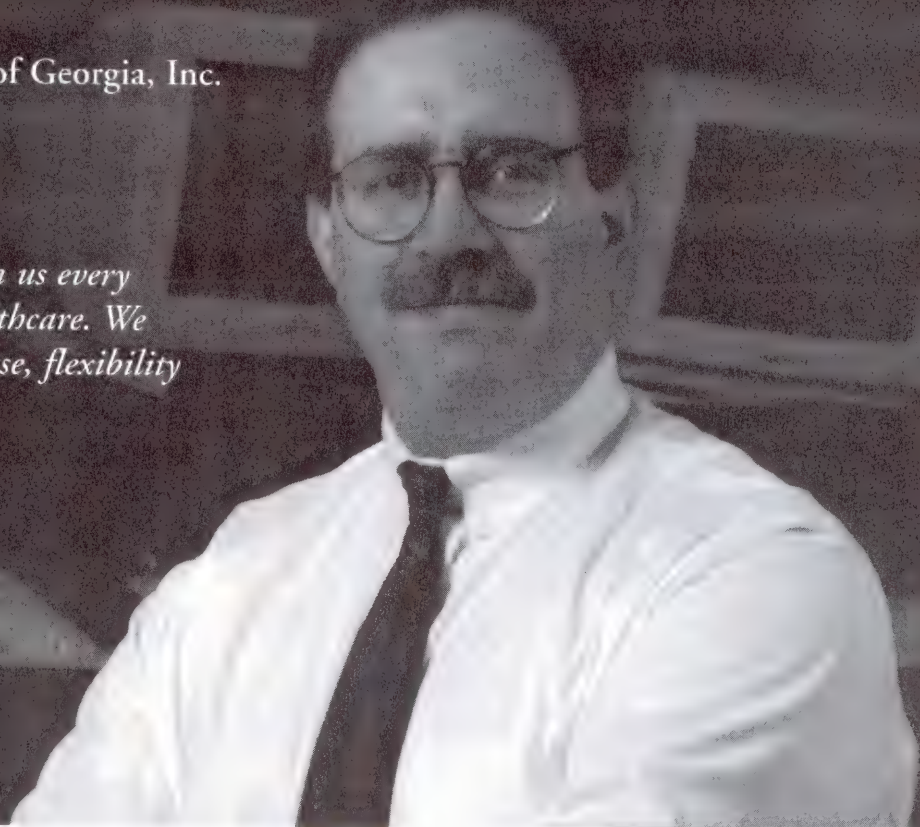


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# The Future Of Disaster Recovery



**A quiet revolution** is unfolding in the HP market. It is centered around the all-important issue of disaster recovery and is being driven by the unique needs of today's typical HP shop.

Disaster recovery in the HP environment has traditionally relied upon a singular solution — the hot site. Many outside vendors have relied exclusively on this product offering for their customers seeking recovery solutions. And in an earlier corporate setting, where cost, convenience and time were more expendable commodities, the hot site satisfied most users adequately.

But today, with many more companies migrating toward a distributed systems environment, the requirements for recovering HP systems after a disaster are changing. HP users are finding the hot site can be an overly restrictive option and increasingly voice their desire for more flexibility in their testing and recovery activities. Disaster recovery should allow a company to resume all of its normal business functions, not just restore a database or two.

For years, customers in the HP market have been offered one standard recovery solution by most vendors — the hot site. A fully equipped computer facility maintained by the vendor, the



hot site serves as an alternate location from which companies can recover and continue to conduct business until their facility is restored. Under most disaster scenarios, a customer's team of data processing professionals relocated to a distant hot site and resumed critical business functions from that site until their homebase was operational again.

The hot site remains a valid recovery solution. But it is one that makes certain assumptions about a customer: Those who continue to find the hot site solution acceptable generally can afford to make sacrifices from a convenience, cost and time standpoint. Specifically, a hot site makes sense for a customer when:

- A single HP system is running, thereby reducing the need for a solution that must respond to multiple platforms.
- A customer's networking and workgroup recovery needs are minimal.
- The company makes little use of LANs or PCs.
- The customer's DP staff can afford to leave the office to travel to a hot site.
- A company's budget can absorb the cost of flying its staff to a hot site and housing them offsite until their facility is restored.

In today's environment, however, fewer and fewer companies meet the

**William J. Beaumont**



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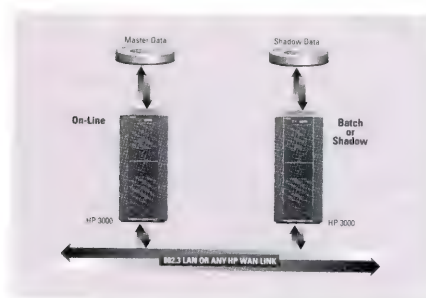
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# Hot Site

criteria listed above. HP shops, generally speaking, tend to be smaller and therefore can't spare critically needed staff to travel to a distant hot site. It is these companies that are most in need of flexible, custom-tailored solutions to meet their recovery needs. Truly responsive recovery vendors will help structure recovery options that best address a company's operational and recovery needs. Among the emerging solutions today are:

➤ **Mobile Data Centers.** A mobile data center offers almost all of the benefits of a hot site with one tremendous advantage — it arrives in a custom-designed trailer, at the customer's facil-

ity. Outfitted with a complete HP configuration, a mobile data center allows a customer to simply relocate its data processing or departmental operation to a designated area, such as a parking lot outside of a customer's office building.

And unlike a standard equipment replacement option, a mobile data center offers customers the all-important presence of onsite technical support from the vendor. During a true disaster, this onsite support staff functions as an extension of the customer's in-house staff, offering much-needed guidance and troubleshooting.

➤ **Regional Recovery.** A second recovery option that presents a more flexible and cost-effective solution than a standard hot site is a multipurpose regional facility convenient to the customer's location. Some vendors maintain facilities in major metropolitan centers that can function as alternative office environments in the event of a disaster. Regional recovery centers make particular sense for customers who have specialized workgroup recovery needs. These regional facilities can be equipped with workstations, LAN and voice recovery capabilities, furniture, terminals, telephones and other office equipment, allowing a sub-

scriber to restore business functions beyond just data processing needs. Because such centers are conveniently located across the nation, customers can minimize the disruption and costs normally associated with flying staff to a more distant hot site.

➤ **Centralized Recovery Centers.** For companies with complex recovery needs mandated by their use of multiple platforms, a large, centralized recovery site may make sense. These facilities specialize in recovery solutions for multiple platform and network-intensive shops, offering subscribers multiple and redundant power, telecommunications and environmental facilities.

➤ **Shippable Solutions.** Relatively new recovery trend that holds wide appeal for the HP market is equipment that

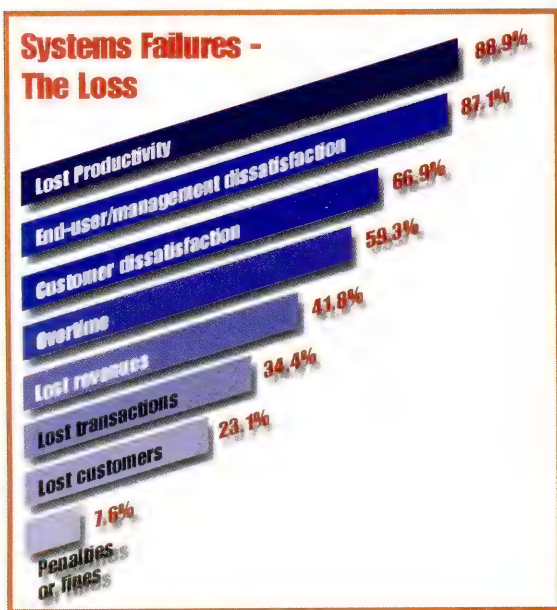
can be shipped directly to the customer. Rushing the latest equipment to any location requested by the customer, a vendor can provide a subscriber with a recovery solution, often in a matter of hours. As another example of the flexibility that characterizes today's recovery options, a few vendors, such as SunGard (Wayne, Pa.), allow a subscriber the option of purchasing the shipped equipment at the end of the recovery period, with all usage fees applied as a credit toward the equipment purchase.

➤ **Electronic Vaulting.** A fifth recovery option that is beginning to attract some attention in the HP market is electronic vaulting. Relying upon such options as remote journaling, high availability standby storage and electronic transfer of application information to a recovery location, electronic vaulting is a premium service that represents one of the most sophisticated means available of reducing or eliminating recovery timeframes associated with mission critical applications. It is a very expensive backup option, but is beginning to be considered by HP users who maintain ever-growing databases in the face of a constantly shrinking "recovery window."

➤ **Planning and Consulting.** Recognizing that getting started is often the most difficult part of planning for disaster recovery, certain vendors now offer planning and consulting services to help customers create a sound, cost-effective business resumption plan. Services range from pure consulting (for example, assessing the strength of a subscriber's business impact analysis) to providing a software package that can help a customer create its own recovery plan.

## PUT IT TO THE TEST

NO OTHER AREA of disaster recovery planning most illustrates the need for flexible solutions as does testing. Particularly in HP shops, where DP personnel are often scarce and end users often are comprised of non-technical professionals, the ability to test remotely has taken on new impor-





tance. A common characteristic of today's HP shop is the lack of resources that allow users to leave their environments to test.

In addition, testing today must be as painless and transparent as possible; otherwise, companies are likely not to test at all, a risk almost as dangerous as having no disaster recovery plan in place. Customer-responsive vendors have responded with a range of options that allow for easier and more convenient testing. Among the newest trends in testing are:

■ *Extending the console control.* Through the use of modems, a recovery vendor can extend the console for the customer and "remote" it to the subscriber's site. This allows the customer to assume control over such important testing applications as rebooting, shutting down and installing an operating system from the console.

■ *Increasing access to the system.* Today, multiple users can enjoy access to the system during a test, all made possible through a standard, dial-up phone line. This low-cost option allows users the benefit of "staying put" during a test and able to fulfill other job functions, as well.

■ *Linking the vendor to a subscriber's WAN.* Outside vendors can become part of a customer's network, through routing and bridging technology that makes the backup or recovery system appear to the customer like another recovery node.

■ *"Absent customer" testing.* Experienced vendors refer to a new trend in the recovery arena as "absent customer" or "customer-less" testing — an approach that attempts to impose upon the cus-

tomers as little as possible but still allows them to enjoy the benefits of sound and complete testing. Once a vendor and customer define the specific goals and objectives for a test, they can turn their attention toward developing a plan intended to achieve those goals.

Today's HP users confront different challenges and needs from their predecessors. Because of the increasing use of multiple systems and the decreasing availability of resources who can be totally devoted to disaster recovery planning, the new byword in recovery is "flexibility."

A prime consideration in planning for recovery solutions is the importance of addressing a company's total business needs — not just its data center requirements. Solutions that speak to work group and remote testing and recovery needs illustrate this new approach to disaster recovery planning.

Companies would be well advised to look for a recovery vendor who offers a full spectrum of solutions, not just a singular reliance on the hot site solution. A competent outside vendor will view its role as one of partnership and will draw upon a range of solutions to build flexible, customer-responsive recovery options.—William J. Beaumont is senior vice president of marketing for SunGard Recovery Services Inc. (Wayne, Pa.), an industry pioneer in the development of business recovery solutions. Since it was established in 1978, SunGard has successfully recovered every single customer who has confronted disaster.

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# That Was

## A Final

## First Look

## At HP-UX

## 10

## This Is

## Now

*This is the final installment of the three part examination of HP-UX 10 we began in March. This month, we are taking a last long look at HP-UX 10 by reviewing and recounting some of its new features and capabilities.*

### DCE:

Is it there? Yes. All HP-UX 10 hosts are DCE client ready. The DCE client software is included in the default system software. A standalone POSIX Threads library (libcma.sl) is also included. The default (free) software includes DCE shared libraries, DTS, NCS runtime, NCS shared libraries and DCE RPC runtime. The optional DCE software (\$\$) has the DFS client software, DCE application development, NCS application development software, man pages and admin tools.

### SAM:

SAM has received many changes — both to its interface and in its functionality. The ASCII interface is, of course, still available and just as unremarkable. The graphical interface, however, now looks just like the file manager. You select an item (task), then you can pull down and choose from the Action menu (you also can double click). There also is another reorganization of tasks, now called areas.

There are a bunch of new capabilities, so browse through it. What struck me as particularly noteworthy include: C2

level security for password and logons can be maintained through SAM; HP 9000 servers (improvements) and workstations (new) now have Logical Volume Manager (LVM) support; workstations get SCSI cascade support; Journal File System (JFS); and log file filters. Also there are interactive additions for custom tasks — better still, they can be placed in any area. Another SAM feature is the ability for root to grant SAM privileges to other users, selectively by task. On HP 9000 servers, SAM won't support hard partitions any more, as this functionality is now handled by the LVM.

### Networks:

Plenty of changes here. And they are spread throughout the many networking capabilities. To take advantage of multiprocessors and threads, the MUX and pty terminal I/O drivers are now multithreaded. All other terminal I/O drivers are multiprocessor "safe." In other words, they under-



stand and handle timing differences that may occur in output from multiple processes accessing them concurrently. As mentioned before, STREAMS system calls are now supported.

HP's proprietary API called NetIPC will be obsolete. This means all the NetIPC system calls, `rlb` daemon, **nodename** command, **proxy** command and **PROBE** proxy services are gone. Any code that uses these system calls need to be ported to BSD sockets. Most of HP's products that used these have been ported (Allbase, X.400, vt3K and HP Integration sockets), but **dsccopy** will be left to die (obsolete).

Van Jacobson's compressed SLIP, called CSLIP is now supported. It gives better performance than SLIP, but is not backward compatible. So SLIP is still shipped. Near as I can tell, PPP is not going to be supported right away. Although not included in the General Business release, HP has contracted with a third-party software house to bundle PPP in with current releases.

Many will be glad that RFC 1191 has been implemented. That is PMTU (Path MTU Discovery). This is a method where software determines the maximum packet size it can ship across an internet connection without it getting fragmented. This allows optimization of utilization of the network connection. In the past, if you came across a difficult network problem, it might have required a network kernel patch to fix it, or using **adb** to install a transport configuration. Under HP-UX 10, there is a new command called **net-tune**. This command will live in contrib for now.

The new command **lanadmin** is a superset of the old **landiag**. Eventually **landiag** will go away.

ARPA services are now called Internet services. The DNS server has been reworked to handle some security issues, and better handle ordering of name lookups. You can now use the name service switch (done in `/etc/nsswitch.conf`) to determine which name lookup (`/etc/hosts`, NIS, DNS) is used, in which order and under which conditions. If NIS is unavailable, try `/etc/hosts`, but do not try `/etc/hosts` if the search in NIS fails. It looks to be

the answer many were looking for, although some of this functionality was available in the Release 9 patch.

For all of you still reading, here's one we've all been waiting for: HP-UX 10 now ships and supports **rdist**. For those who don't know, **rdist** allows you to copy a file to multiple remote hosts with one command. NTP is now a supported feature. And a primary server can be just an ordinary local clock on a host. This will keep all the clocks in a network in sync.

ftp could give you trouble if you do not fix everyone's shell pathname to the new `/usr/bin/sh` instead of `/bin/sh`. This is due to the library call **getuser-shell()** does not contain the old pathnames by default, and the shells have moved due to SRV4 file system changes.

NFS automount has been changed to now require a client to have a netgroup entry that matches the servers before a mount is allowed. Under HP-UX 9.x, if an NIS client booted, and it could not find its NIS server, it would **kill ypserv**, then unset the **domainname** variable. It no longer unsets the **domainname** variable, so it will be easier to recover from the problem. In addition, you can set a host to wait for its NIS server at boot time, or continue without NIS. As a security feature, you can now create a `/var/yp/securenets` file that contains a list of IP addresses that this **ypserv** will allow bindings from. On NIS clients, you can create a `/var/yp/secure servers` file. **Makedbm** now accepts a couple of options for security, the **-s** option forces **ypserv** to only accept request from reserved ports. The **-b** option allows **ypserv** to call DNS if no match is found in the hosts maps.

Secure RPC is now supported, so there are many new commands that exist to support it. Most of these commands have the word "key" in them: **keylogin**, **chkey**, **getkey**, **keylogout** and **keyserv**

### Programming:

For programmers, you'll immediately notice that all your pathnames for libraries include files, and the compilers themselves have been moved for SRV4

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CIRCLE 13 ON READER CARD



## HP-UX 10

reasons. For example, the C compiler **cc** was in `/bin`, now it lives in `/usr/ccs/bin/cc`. All the compilers now have new and obsolete options, so the man pages need to be re-visited (or use the Release Notes). C++ provides multithreaded programming support, as well as 4-Byte EUC (Extended UNIX Code). There is now a shared library for the Fortran compiler.

Archive files can now have filenames over 14 characters. The linker now eliminates procedures that are never referenced (dead procedures). This can be overridden if needed.

DDE (originally written by Apollo computer for Domain/OS) is now the strategic debugger — that is, HP's primary debugger. It has been integrated into SoftBench. HP PAK also is integrated into SoftBench. As required by the COSE API (Spec 1170), several libraries have been changed. HP-UX 10 conforms to the XPG4 Base Profile.

### Graphics:

There are new graphics cards being supported, and many files renamed for SRV4 consistency sake. Starbase graphics is no longer supported on the HP 9000 Series 800, because it is a server type product. But, HP 9000 Series 700s still support it. There were some enhancements to the X server driver. There are some new or updated software products planned, like support for WinApps, PHIGS 3.0, PEX 5.1 v2.0, PowerShade 3.0 and ARTCore.

HP VUE 3.0 now includes the Audio button, and hpterm has had some improvements. hpterm now includes support for the HP 9000 Series 700/96 block mode terminal and 4-byte EUC.

In the multimedia arena, some pretty good stuff comes cheap. SharedPrint (without the PostScript translator due to licensing) and the Audio editor from MPower 2.0 are now bundled with the base OS. If you did not have SharedPrint installed before, look into it, it is a great product. It catches files sent to the printer and automatically invokes the correct format filters so users don't have to specify options to

lp. It also supplies a GUI for printing. The Image viewer from MPower 2.0 is now also included, it has file conversion (for example, gif to tiff) printing and viewing controls.

### Commands:

Although the list of command changes is lengthy, changes to commands fall into three categories (many of them are insignificant):

- Changes in locations due to SRV4 file system format.

HP-UX 9.x already conformed to XPG4 Base Profile. Almost all commands were moved, but look to the section on file system changes for more information about that.

- Changes due to bug fixes or lack of functionality.

Changes due to bug fixes affect the **tar** command, as noted above, and for all of you that like long link names (like ftp site administrators), fixing **tar** was the most important things done here. **tar** now handles 100 character link names correctly. The **talk** and **patch** commands have been finally implemented

- Changes to conform to XPG4 Internationalised System Interfaces.

Most of the file system commands were changed to support more file system types, and have a wrapper program to pass them that information. We could go through the big list of minor changes (like **cat** now having an **-n** switch), but it would be best if you read the entire list, as everyone has their "pet" commands.

Like for me, being able to use wildcards in the DOS filenames with **dosecp** command is great, as is having the **gzip**, **gzcat** and **gunzip** commands shipped in `/usr/contrib/bin`, and it is about time the **more** command could go back up in a file. For you, it might be the long linknames in **tar**. — Fred Mallett is owner of FAME Computer Education, which provides UNIX usage, administration and programming classes, and HP Professional's UNIX SYS\_ADMIN columnist. He can be reached at [frederm@aol.com](mailto:frederm@aol.com).

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# CDE On The Horizon

**I lived in the Midwest for a while some time back. Not that you care. But it does let me lead into**

this article easier. Sometimes on hot summer evenings, you could hear thunder rolling around. Those storms often made a lot of noise, but never seemed to get here. They remind me in many ways of UNIX standards.

This month we are going to do a system administrators run down of yet another standard that never seems to get here. But in this case, I am sure it will. CDE (Common Desktop Environment) is one of the offspring of the COSE (Common Operating System Environment) agreement. The purpose is to get a universal desktop environment across any platform of workstation (or X station) running UNIX. The picture that we are being asked to visualize is one of all vendors' workstations in our network wearing the same makeup (window manager). This window manager is called dtwm, which is CDE's central component.

Here is my two-bit description of CDE: Take HP VUE. Remove the HP VUE desktop tools (calendar, mail), use the OpenWindows versions of these tools instead. Get rid of BMS, and use ToolTalk Message Daemon

instead. Add some application configuration guidelines and utilities. Throw in some nifty add-ons (dtksh, dtterm, toolbox build). Make the front panel both dynamic in use and building. Enhance the style manager. Cook for 3.5 years, and Presto! Not quite instant CDE.

Some of the things that make CDE very attractive to me are listed below. Remember that (as I write this) you can currently get CDE snapshots from HP, but the versions are not quite up to production quality yet. I was running the March 95 version, and it worked very well for just loading and learning purposes.

To install from the CD-ROM, treat it as you would any HP-UX product:

```
# /etc/mount/dev/dsk/<device_file>/UPDATE_CDROM
# /etc/update
```

You can then set source to the CD-ROM, and select the filesets shown below for a runtime system, or select all for a development environment.

```
# ls /etc/filesets | grep -i cde
CDE-DEMOS
CDE-FONTS
CDE-HELP
CDE-HELP-RUN
CDE-ICONS
CDE-MAN
CDE-MIN
CDE-MSG-CAT
CDE-RUN
CDE-SHLIBS
CDE-TT
```

Postscript Documentation can be printed or read directly from the CD-ROM. The *Advanced User's and System*



*Administrators* book is the most detailed. They are in the hardcopy directory. A runtime load takes up about 32 MB, as seen in the command below. A full load would be about 55 MB (110,000 512K blocks from du). Most CDE software lives in the two directories below, but remember that configuration files follow the SVR4 format, so that all dynamic (edited) files would be copied from /usr/dt/config to /etc/dt/config, this is all documented well in the aforementioned book.

```
# du -s /usr/dt/var/dt /usr/dt/bin/dt
64860 /usr/dt      #32MB runtime 55MB Full
26 /var/dt
```

## FIRING UP CDE ON HP-UX

There are two primary methods. One would be for testing purposes only, the other would be for "permanent" use on a box. Remember that VUE and CDE are both fully loaded on a workstation, and you can change back and forth at will. If you just loaded it, you probably want to see it right away. You can manually start CDE, assuming you loaded software from single user level. If you are in VUE, log out. Then log in with the "no Windows" option at the login screen so that X is not running. While logged in as root with X not running, use the following command to execute the login manager directly:

```
# /usr/dt/bin/dtlogin -daemon
```

If you edit the following line into /etc/inittab:

```
dt:5:respawn:/usr/dt/bin/dtrc
```

You could instead use the **telinit** command to change to the run level specified (5 in the above example):

```
# telinit 5
```

Note: In either method, if a user does a [CONTROL][SHIFT][BREAK], they will be able to issue commands at the underlying root shell until CDE restarts (about 10 seconds), so this is for testing only. This is not mentioned in the CDE documentation. For a user machine, you should start CDE at boot time so that there will not be an underlying shell to the login manager.

To do this, edit the /etc/inittab file so that there is an entry for the CDE startup script (/usr/dt/bin/dtrc):

Then change the first line of the inittab file from the line that starts VUE:

```
init:4:itdefault:
```

or

```
init:3:itdefault:
```

To the line that will start CDE:

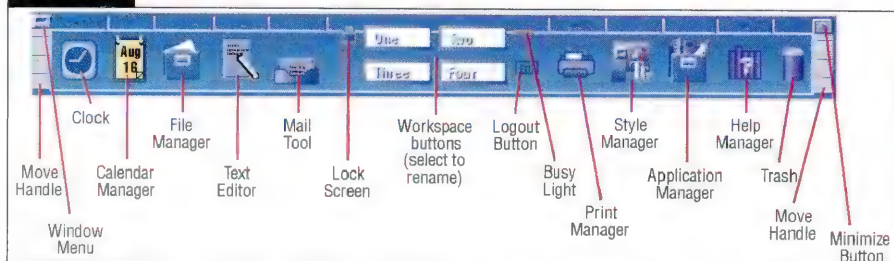
```
init:5:itdefault:
```

After any of these steps you will see the CDE login window, which is very similar to VUE's. After login, you will get the CDE front panel.

## CRUISING AROUND IN CDE

Once logged in, here is a list of the major features changed from VUE to CDE: new front panel layout; only one "toolbox," now called Application Manager; four workspaces (and you can rename them by clicking on the name); new dtterm terminal emulator (a mix of command tool, xterm, hpterm); all new desktop tools (SunOS' mailtool, calendar manager and enhanced VUE file manager); drag-and-drop front panel customization — this is cool. You can drag an icon from the application manager (what VUE called a toolbox) and

FIGURE 1



Major changes in CDE include the Application Manager, four Workspaces, new desktop tools, and drag-and-drop customization.

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## This is cool. You can drag an icon from the application manager and drop it on a subpanel.

drop it on a subpanel; new menu strings (in the same old menus); file manager has path icons (similar to OpenWindows); menu accelerators are active by default ([ALT] [TAB]) to circle up; Style Manager changes (animated screen saver); and enhanced Create action tool.

There are quite a few administration changes, some are based on the fact that CDE conforms to the SVR4 filesystem, others are due to the advanced configuration control of application locating that CDE provides. Here is the list:

- All new pathnames to files (mostly similar names, vuelogin became dtlogin)
- New application integration method
- New easier to use hooks for customization
- New file entries for network configuration
- New dynamic application manager "gathering" method
- New dtksh tool for writing X dialogs with korn shell scripts (and 100 character long X system call names)
- Simple method of assigning "Application Servers"

There is now a well documented, and organized method for integrating applications.

You must create (or maybe the application companies will develop and ship) a "registration package." This package consists of all the action and file type definition files, groups definitions (just another file type), action files, front panel components and other pieces needed to make the application fully integrated into the CDE desktop. Once these files are on the disk (or network) you run a **dtappintegrate** script that creates symbolic links from system locations (or a location that you add to a search path variable) back to the application package. This allows the dynamic application gathering program which is run from the Xsession.d files at login time to find all the pieces, place

the icons for the application into the Application manager, and load all actions and file types needed for the application.

The major configuration method in CDE is the usage of searchpath variables. VUE used these variables also (similar names), but they were not documented very well. For example, to gather all the applications integrated into a server, into the application manager on your host, you would simply add the server hostname to your **DTS-PUSERAPPHOSTS** variable in your .dtprofile file (think of .vueprofile).

As far as migration, you will have to change any .vf files you have created for VUE into the CDE format, and name the new files with a .dt suffix. For example, here is a simple action for VUE, in the file \$HOME/.vue/types/goodies.vf:

```
ACTION hpterm-puxy
WINDOW-TYPE NO-STDIO
EXEC-STRING "/usr/vue/bin/hpterm"
EXEC-HOST puxy
END
```

To migrate that action to CDE would require copying it to \$HOME/.dt/types/goodies.dt and editing it to look like this:

```
ACTION dtterm-puxy
{
WINDOW_TYPE NO_STDIO
EXEC_STRING "/usr/vue/bin/dtterm"
EXEC_HOST puxy
}
```

Note all the - were changed to \_.

My recommendation is to get the CD, and print the *Advanced User's and System Administrator's Guide* book, study it some or take a class to see what else is new. Then load it up and have some fun.

Mallett's Internet address:  
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CIRCLE 155 ON READER CARD

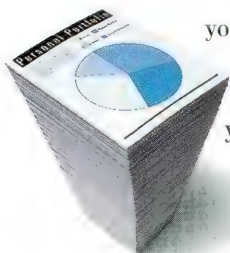


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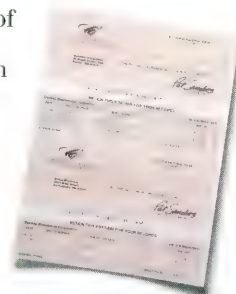
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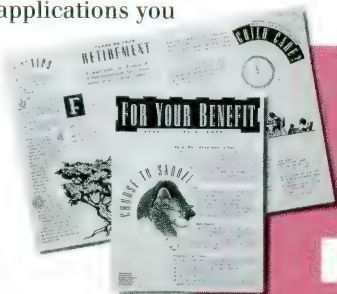
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**CIRCLE 115 ON READER CARD**





# Talk is Cheap, Show Me: NetWare/iX

**Several months ago, I stated the HP 3000 was a world-class general purpose server platform**

(see *Integrating Your HP 3000*, August 1995). I argued that in the multitier client-server paradigm the HP 3000 is a good fit at the application/workgroup level and at the enterprise level. I went on to list why and decried HP's lack of promotion of the HP 3000 for this role. Talk is cheap, so I decided to examine in some detail the HP 3000 as a general purpose server platform.

Despite inroads by Microsoft's Windows NT and IBM's OS/2, Novell's NetWare remains the dominant server NOS. As reported in *Information Week* (September 11, 1995), "Novell [shipped] 49.5% of all server operating systems sold in 1994, according to International Data Corp., a research firm in Framingham, Mass."

NetWare/iX for MPE/iX 5.0 (HP 32020B) is HP's implementation of Novell's NetWare for UNIX version 3.11A. Unlike native NetWare for Intel platforms, NetWare for UNIX runs on top of the host's operating system — in the case of the HP 3000, NetWare/iX is a collection of daemons (background processes) and utility programs that run on top of MPE/iX. Version 3.11A of NetWare for UNIX is roughly equivalent to Novell's

Native NetWare v3.11.

NetWare/iX takes advantage of the POSIX Hierarchical File System (HFS). The HFS is used to define a mount point which becomes the "root directory" of the NetWare/iX volume. With certain constraints, files stored in NetWare/iX volumes are accessible and visible to POSIX-aware apps. Further, a NetWare client can access a file created by an MPE application.

Obviously, neither I nor HP is suggesting that you buy an HP 3000 to act primarily as a NetWare file and print server. But, if you already have one or more HP 3000s and want to establish a NetWare network for file and print sharing, or want to integrate your HP 3000s into an existing NetWare network, NetWare/iX is something you should consider.

NetWare/iX advantages include:

- lower start-up costs — NetWare/iX licenses cost less than the hardware/software PC solution for the same number of clients
- lower operational costs
- PC client access to host printers
- HP 3000 reliability and availability
- single point of support Native NetWare version 3.11 features not available in NetWare/iX:
- NetWare loadable modules (NLMS)
- IP tunneling and burst mode
- support for Mac and OS/2 clients
- hybrid user facility
- NetWare Virtual Terminal
- NetBIOS API

Additionally, situations where NetWare/iX would not be appropriate



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CIRCLE 211 ON READER CARD



(at least not as the only or primary NetWare server) include: "large" numbers of client users sharing files on the server; "intensive" file sharing; and

"very high" performance requirements.

NetWare/iX requires at minimum a HP 3000/9xx with 48 MB of RAM and 25 MB of available disk space run-

## BURKE'S BITS:

**Network Printer Support.** A year ago, I excitedly reported that HP committed at Interex '94 to providing HP 3000 native spooler support for network printers. Then last winter, HP furiously backpedaled and took the official position that spooler support for network printers was adequately provided by third-parties (*HP Advisor*, February 1995).

After nearly a year of angst, the following appeared buried in HP's Press Kit under the heading "Coexistence Enhancements in MPE/iX": "HP also enhanced its integrated MPE/iX print spooler that brings page-level print management to networked printers. The spooler expansion allows users to print easily to any HP laser printer connected via a JetDirect interface over TCP/IP networks. The free enhancement to the spooler delivers basic connectivity between HP 3000 users and TCP/IP network printers. A benefit — such as page-level recovery, vital for HP customers who rely on business-critical systems — is expected to be available in the first half of 1996 for any printers that support this feature. HP Channel Partner solutions for MPE/iX print management continue to provide enhanced value through advanced printing and routing features."

The functionality is limited, but I did see it working.

**HP 3000 Advertising.** OK, HP caught me red-faced. Shortly after submitting the text for my August column, in which I ranted and raved about HP's failure to deliver on promised HP 3000-specific advertising, an advertisement for the HP 3000 appeared in such general trade publications as *Computerworld* and *Information Week* (one of a series of ads alternately featuring the HP 3000, the HP 9000, HP PCs, etc.).

HP, I applaud you for keeping your word. However, the sound you "hear" is the sound of one hand clapping. The ad is wimpy and forgettable. When compared with the ad for the HP 9000, the HP 3000 ad suffers even more. The HP 9000 ad lists an 800 number and a World Wide Web URL for further information; the HP 3000 ad, nothing. The HP 9000 ad boldly proclaims: "You have impossible IT goals. You need leading-edge UNIX servers to reach them." And then goes on to say that means you need the HP 9000. A version of the HP 3000 ad says: "The latest Datapro User Survey of midrange systems ranked the HP 3000 #1 in system reliability ahead of Stratus, Tandem and everybody else." Duh. There is a market worth attacking. How about naming some real names? Like the IBM AS/400? Oh, and maybe one of those UNIX systems covered by "everybody else"? The HP 9000, perhaps?

The rise of Microsoft and Oracle has more to do with the aggressiveness of their marketing than with the quality and innovativeness of their technology. The best advocates for the HP 3000 are in the customer base, not in CSY marketing.

**Tricks Of The Trade.** More on **ANYPARM**. Certain CI commands, for example **SPOOLF**, can accept a variable number of arguments. A general purpose UDC or command file to delete a variable number of spool files can easily be created using **ANYPARM**:

```
ANYPARM parm_list  
SPOOLF (!parm_list);DELETE;SHOW
```

Fans of CI programming will be delighted with some of the new features scheduled for MPE/iX 5.5, courtesy of Jeff Vance. New functions include **WORD** and **PMATCH**. **WORD**, which is similar in concept to the intrinsic **MYCOMMAND**, can be used to parse strings. **PMATCH** provides string pattern matching using the same pattern descriptors as **LISTF**.

ning MPE/iX 5.0. LAN link must be installed and configured in NMMGR. This is bundled with MPE/iX 5.0. Before 5.0, this was a separate product. You also must have a DOS PC with a compatible network interface card (NIC) and driver software that can be set up as a NetWare client. If you have one or more networked DOS PCs running a terminal emulation product, you already have LAN link installed and configured correctly. You also need a PC that can be a NetWare client. Setting up at least one PC for networked terminal emulation is a good way to verify correct installation and configuration of LAN link and your PC's NIC and driver software before proceeding with the installation of NetWare/iX.

If you decide to consider NetWare/iX, a free 120-day trial version (HP J2253B) of the complete product is available.

I would like to say that the NetWare/iX installation was uneventful and trouble free, but it wasn't. I was one of the first to order this trial version and, because of miscommunication in the distribution pipeline, it would not install with **AUTOINST**.

Once I received a properly prepared subsys tape, NetWare/iX installed easily on my HP 3000/918 using defaults. Total system down time: less than 3 hours (Note: I was already on the latest version of 5.0, so no patches or other updates were performed). Once installed, configuration of NetWare/iX can be done online.

NetWare/iX comes with the DOS and Windows client software on 5.25- and 3.5-inch disks. The NetWare DOS shell (usually **NETX.EXE**) is a Terminate-and-Stay Resident (TSR) program that is an interceptor for DOS services. It determines whether requests from applications should be sent to DOS or NetWare. It is placed in your **AUTOEXEC.BAT** file after the various driver and transport programs. I followed the setup instructions precisely, fired up my PC and stood back ready to admire my handiwork. Bzzzz. When DOS tried to load \netware\netx.exe, I got the error message **Shell requires DOS v3.0 - v6.0**. It seems **NETX**



checks the version of DOS and was set to accept a version number between 3.0 and 6.0. My PC was on version 6.22. What to do?

Somewhere in the dark, scary recesses of my mind, I pulled out a recollection that there is a way to tell DOS to lie to a program that requests version information. Sure enough, the **SETVER** command and SETVER.EXE program can force DOS to lie. So, I told DOS to report 6.0 to NETX.EXE. Problem solved.

The instructions for installing the Windows client software do not take into account Windows for Workgroups. That cost me another hour figuring out that I had to "install" networking even though I had installed the Windows client software.

The final installation problem I want to relate is a much sadder story, because it includes a system abort on a Friday afternoon (the system manager's nightmare: create a system abort while testing software). The root of the problem is in print services. I used the default configuration values which called for a system printer named "LP." Every system, including ours, has a printer named "LP."

We have two "printers": a real printer hooked up to LDEV 100 on a DTC and a virtual printer on LDEV 6. The NM spooler does not seem to care that two printers have the same device name, but NetWare/iX most certainly does. When I tried to print from the NetWare client to the system printer, the very first attempt after bringing up print services would succeed but all subsequent attempts would hang. The second would show as active and all the others would be queued. It was while I was trying to delete the "active" print job that I got a system abort. The solution is to use the LDEV number, not name, of a real spooled printer in the print services configuration. Once I made that change, print services worked fine.

Next time, the functionality and performance of NetWare/iX.

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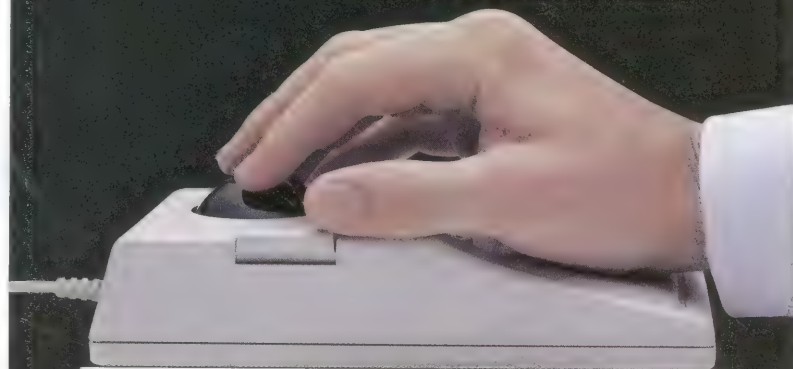
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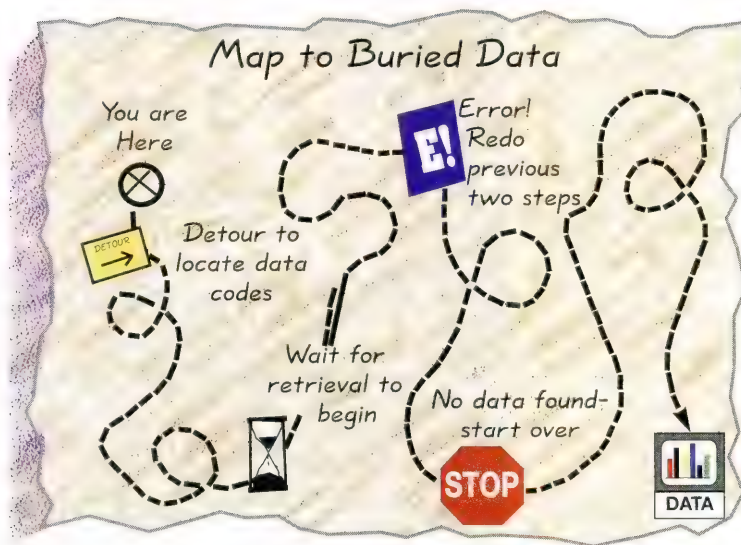
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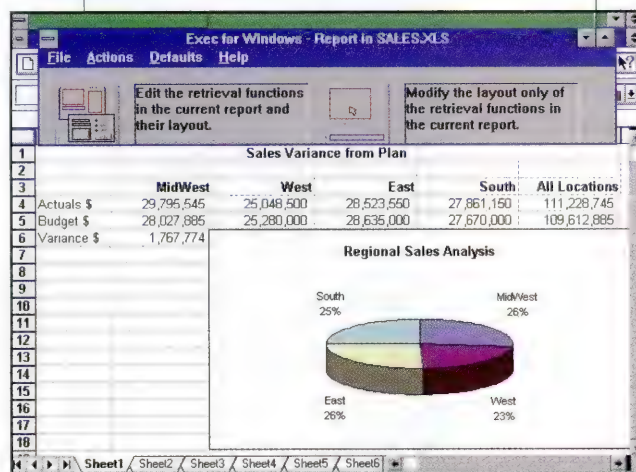
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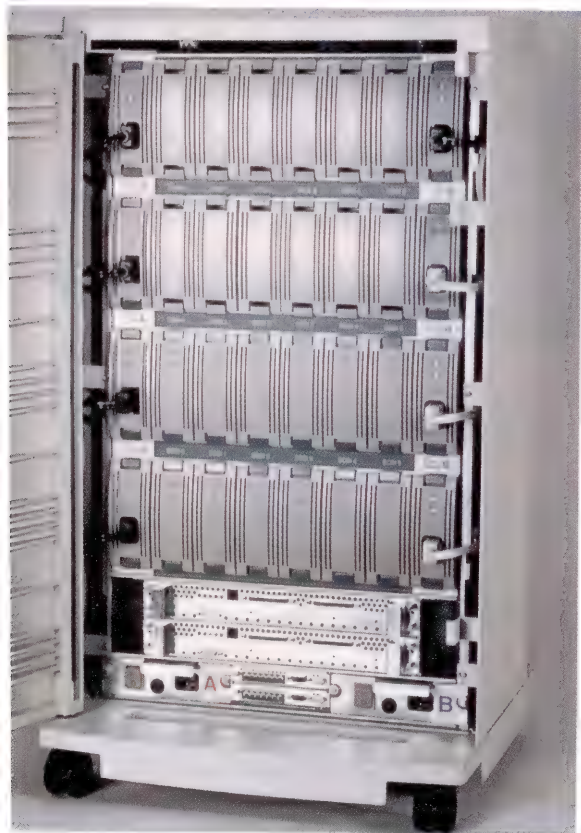
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# HP Professional's Guide To Mass Storage And Memory



## Chipping Away At Memory

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## HP Workstation Memory

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## Is Tape Dead?

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## RAID's New Mission

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## HSM For NetWare

Pg. 60



# Memory: Meeting The Demand When the Chips Are Down

Joe Klein, Ph.D

The memory industry is at the best of times because end users just can't get enough of it to run their memory-intensive software and operating systems like UNIX, OS/2, Windows NT and recently, Windows 95. However, it is also the worst of times because the memory industry is having difficulty keeping up with the intense demand, from both a supply and development standpoint. Therefore, the good and the bad aspects of this great memory demand have created the most exciting and challenging time in the semiconductor business.

DRAM (Dynamic Random Access Memory) semiconductor chips are the primary components used in memory systems. Most DRAM is made using complementary metal oxide silicon (CMOS) semiconductor technology ranging from 0.8 to 0.3 microns in size.

While the size of DRAM has been getting smaller, the density of the chips has been rapidly increasing. For example, only a few years ago, 1 Mb and 4 Mb DRAM was considered state-of-the-art. Today, we find ourselves using 16 Mb technology as the standard, and 64 Mb DRAM is on the horizon. In fact, some semiconductor companies have successfully built 256 Mb DRAM in their research labs with 1 Gb DRAM being planned.

With these technology advances, we also have seen a reduction in voltage requirements. Just a few years ago, 4 Mb DRAM chips were primarily 5 volt devices. Presently, 16 Mb DRAM is being made in 5V and 3.3V. In the near future, 64 Mb will only be 3.3V technology. Lower voltage requirements are particularly useful in portable computing applications where they extend use between battery charges and prolong battery life. Also, as voltage requirements drop, speeds increase via reduced access times. In fact, the average

speed is dropping from 70 ns to 60 ns to 50 ns. DRAM also comes in a variety of configurations. As the density of DRAM chips becomes greater, a larger variety of configurations become available. For example, 4 Mb DRAM chips are organized as 256Kx16, 1Mx4 and 4Mx1 while 16 Mb DRAM chips are organized as 1Mx16, 2Mx8, 4Mx4 and 16Mx1. Sixty-four Mb technology will offer even greater variety of configurations.

## EDO EMERGES

DRAM chips are designed with a great deal of features to satisfy many applications. The most common today is Fast Page Mode. However, EDO (Extended Data Out), also called Hyperpage Mode, is starting to replace Fast Page Mode because one can obtain faster bus performances. EDO memory will become common

as more and more chip set vendors fully support it. The conversion is starting to happen this year. Some of the desktop OEMs have already implemented EDO, while the notebook OEMs are just beginning to introduce the EDO feature in their products. The workstation developers are currently designing in EDO and should launch by late '95 or early '96.

Last, but certainly not least, the packages for DRAM are slowly evolving. A few years back, memory was pin through-hole packaged. But with the advent of surface mount technology, DRAM is packaged in SOJ and TSOP surface mount configurations.

The TSOP package, because of its very thin profile, is used in many of the workstation and notebook computers where space is a significant issue. In some niche markets, memory manufacturers are employing DRAM stacking techniques to achieve greater densities. However, emerging semiconductor

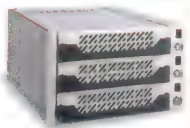


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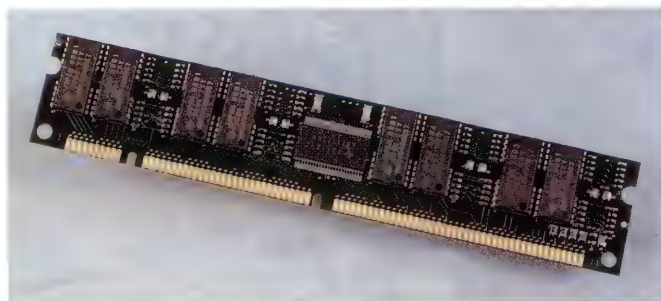


technology is rapidly making stacking techniques an obsolete solution. This will be particularly true as the price of 64 Mb DRAM starts to decline.

## MEMORY MODULE TECHNOLOGY

Memory modules have two purposes. First, they are designed to make the DRAM compatible with system bus organization. In other words, the system designers usually want to match the processor bus size. Secondly, memory modules allow a system designer to implement future memory upgradability. This second point is important because the end user can purchase a system at an economical price point and when their requirements become greater, they can upgrade their memory easily and economically.

Today's memory modules can be classified into four basic categories; one-byte modules (30-pin SIMM), four-byte modules (72-pin SIMMs or 72-pin SODIMMs), eight-byte



*A 168-pin DIMM*

modules (168-pin DIMM) and custom modules (HP 9000 workstation memory).

Memory modules also have many different features such as parity bits and error correction code (ECC) bits. Most of the workstation computers employ some kind of parity checking or error correction to ensure the reliability of the data

## MORE MEMORY: HP WORKSTATIONS

Two basic ways to speed up a computer system are to increase clock frequency or process information faster and to do more processing in each clock cycle. Early implementation of RISC design used topology similar to the MC68000. The design objective was to execute one instruction in one clock cycle. An alternative approach has been taken by introducing a 64-bit wide instruction path that enabled execution of two instructions per clock cycle. At the same time, a set of floating point compound instructions had been introduced and the result was Superscalar RISC. The design is more complex and has to be implemented with multiple chips. This caused disadvantages.

HP made many advances in the area of Superscalar technology and has single chip Superscalar design at a high clock rate. Because of high speed semiconductor technology, implementation of multiple instructions per clock cycle became possible. Also unique to the PA-RISC is the use of large off-chip cache memories (D-cache 4K to 2 MB, I-cache 4K to 1 MB). The use of off-chip caches has many advantages; the caches are made by industry standard high-speed SRAMs cycled at processor frequency. Assist cache, introduced with PA-7200 processor, speeds data transfer between off-chip cache and processor while reduces cache miss rate that contribute to

better performance again. Obviously, PA-RISC has been designed to perform well on real-world applications not only on SPECmarks (System Performance Evaluation Cooperative). This very powerful integer and floating capabilities (five-stage execution pipe line, graphics capabilities on-chip, symmetric multiprocessing, compiler technology) contributes to HP's leading position in the computer industry.

The cost of a workstation today is primarily made up of the cost of the main memory and the display. The CPU has become a very small percentage to the total system cost. HP continually has been pushing clock rates higher. PA-RISC processors — PA-7000, PA-7100, PA-7100LC, PA-7150 and PA-7200 — operate at different clock rates within a frequency range 48 MHz to 125 MHz. Innovation has been used to maximize processing per shorter clock cycle in an effort to make the best use of finite memory speed. An interesting memory system design can be seen in HP 9000 workstation family. The memory type is ECC and consists of a VLSI memory controller, buffer/controller on the memory board, 144-bit memory array and data MUX.

The memory controller creates multiplexed address bus, control signals and data for memory array. It also performs EDC (Error Detection Correction) and then multiplexes

data onto a 32-bit processor bus. Designed long ago, first in the low-end HP 9000 Model 720 in 1991, the memory controller supports 1, 4, 16 and even 64 Mb DRAMs. A few DRAM manufacturers started sampling 64 Mb memory chips only a few months ago. The memory array is split into two 72-bit (64 data bits, 8 EDC bits) custom memory boards. The buffer/controller on the memory boards serves 18 memory chips, so memory boards have to be installed in matched pairs. When the HP 9000 Model 720 appeared on the computer market, only 16 MB memory upgrades were available. Soon 32 MB memory upgrades were introduced. The maximum system memory of 128 MB was limited due to DRAM technology available at that time. Later, with 16 Mb DRAM technology 64 MB memory upgrade was introduced. And the maximum system memory was increased to 256 MB in the HP 9000 Model 720.

Descending order of memory module pairs installed, starting with the lowest memory slot pair in HP 9000/400 workstation family is a necessity; while in the HP 9000/700 workstation family, installation of pairs may be in any order starting with any empty memory slot pair. Unfortunately, if only one memory module is not properly installed your system will fail to boot.

*continued on page 55*



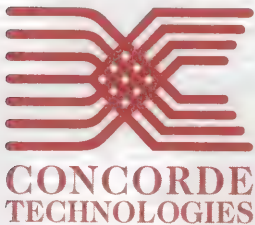
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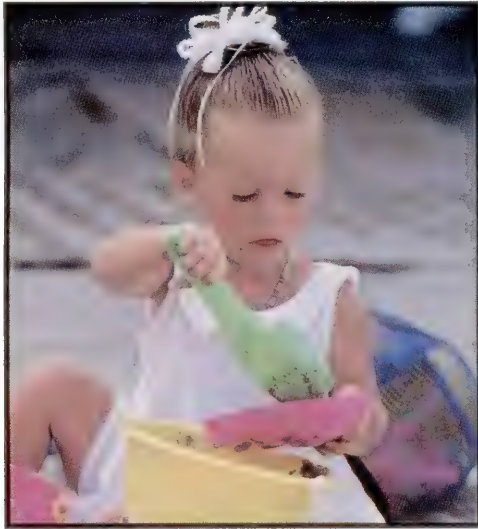
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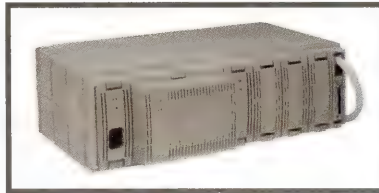
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processed through the memory. The entire line of HP 9000 workstations uses ECC to protect data. In general, the workstation industry is using four-byte or eight-byte SIMMs and DIMMs with a variety of custom pin-outs. The desktop market predominantly uses JEDEC standard four-byte SIMMs with some movement into the JEDEC eight-byte DIMM standard. The one-byte SIMM is seeing little use except in the after-market where customers are still upgrading their systems. Apple has just recently announced using the eight-byte DIMM in its 9500 series high-end system. Like standard 72-pin SIMMs, the 168-pin DIMMs are mainly nonparity at this time.

The notebook modules come in three basic categories. They are custom modules, 88-pin IC DRAM cards or 72-pin SODIMMs. Each of these can come in 5V or 3.3V. Because of power considerations, the notebook designs are quickly moving to 3.3V technology. This is probably where the 64 Mb technology will be used initially because it is all 3.3V.

## SRAM AND FLASH RAM TECHNOLOGY

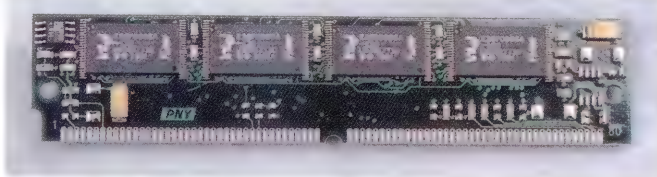
SRAM and Flash RAM is being used to a greater extent in new computer systems to enhance performance. For example, SRAM is being used on modules as Level 2 Cache upgrades. These upgrades enhance the computers performance as much as 30 percent because SRAM is faster than DRAM. Flash also is being placed on SIMMs and in PC

**In general, the workstation industry is using four-byte or eight-byte SIMMs and DIMMs with a variety of custom pin-outs.**

Cards for nonvolatile memory applications. Many of the networking systems are using Flash SIMMs to hold routing tables. These tables can then be updated when needed. Because Flash is nonvolatile, the routing tables are not lost when the systems are powered down. The printing industry also is using these types of devices to hold font sets in the printer with ease of updating.

Tight DRAM supply and shrinking time-to-market windows make it the worst of times for the memory industry. However, the

satisfaction of designing and manufacturing a product in such high demand make it the best of times. What's more, the increased reliability and accelerated performance of emerging



A Flash SIMM

memory technology make it the best of times for the end-user too. —Joe Klein, Ph.D, is the director of Research and Development for PNY Electronics Inc. (Moonachie, N.J.), a leading manufacturer of memory modules.

## MORE MEMORY (continued from page 52)

In spring 1995, HP announced the HP 9000/K-class servers (K100, K200, K400) and J-class workstations (200, 210). All new systems are based on PA-7200 and are capable of handling large amounts of memory, up to 2 GB. Maximum main memory depends on the model and HP-UX installed. In these HP systems, deallocation of bad memory seems to be possible. Memory upgrades are 32 and 128 MB.

An economical and easy approach to better performance is to upgrade the main memory. With limited memory, the CPU has to access the application program instructions and data from

the disk drive. By using added memory instead of slower media, the CPU works on a faster electronic environment that results in enhanced processing speed. GUIs, CASE, object-oriented programming and memory intensive databases are some applications which require more memory. Computer systems come with standard (or minimum) memory to keep the price down.

New K-class and J-class systems are designed so that they easily can be upgraded when the next generation PA-RISC, PA-8000, becomes ready. The 64-bit PA-8000 processor should double the performance of the best PA-

7200. It should be capable of processing up to four floating point operations per clock cycle. HP's PA-9000 (Super Parallel RISC) will follow with increased performance by executing more instructions in parallel. Simply said, the best is getting better, the design of HP leadership in the computer industry will undoubtedly continue in the future. —Boba Popovic has a masters of science engineering of electronics and is senior hardware engineer for Camintonn/ZRAM Corp. (Irvine, Calif.), a leading supplier of workstation and other systems memory.




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## Sorting Out Storage:

# Is Tape Obsolete?

R I K M U S S M A N

As the mass storage market becomes crowded with new alternatives and fluctuating prices, can the oldest player in the game maintain its leadership position? More specifically, what is the role of tape backup as new, viable technologies emerge? Obsolescence can only be avoided by continued evolution and innovation.

The tape market will prevail because it continues to offer advantages over other storage alternatives. More importantly, the choice of storage media will depend on the specific needs and dynamics of the organization. While we're waiting for the dust to settle in the storage market, let's review the technologies that are fighting for position.

The optical market established a successful niche among applications requiring long audit histories — such as manufacturing (where ISO 9001 requirements dictate that a history of product revisions be maintained), imaging, banking and finance. The optical media is less expensive than disk, faster than tape and an optical jukebox keeps the data near online on a reliable, long-life media.

Optical technology, however, will have a difficult time evolving from this niche to new applications. A formidable challenge is presented by the maturity of recordable CDs (CD-R). Major price reductions and development of support software for CD-R have prompted their movement into corporate America for safe archival and cost-effective data dissemination. The popularity is further enhanced by the ability to network CD-R systems in work groups for data archiving and distribution. The unalterable, reliable media makes CD-R especially attractive to imaging applications in large banking institutions.

Close behind is the emergence of phase change, Phasewriter Dual CD-ROM (PD CD-ROM). The breakthrough allows users to write, rewrite and erase a 650 MB, single-sided compact disk. CD-ROM can now be used for general storage, an application that CD-R does not address (because it is write-once). Phase-change CD-ROM therefore poses more of a competitive challenge to tape than to CD-R. The speed and durability of the media are primary benefits, while the incompatibility with the widely installed base of CD-ROM drives and the average \$50 media cost may slow market acceptance.

The concept of near online, traditionally associated with optical drives, is becoming obsolete due to dropping prices of other media. With near online, data that isn't used very often is transferred to a nearby optical jukebox. If access to a file is only required once a year or so, access times

of up to 15 minutes can be tolerated. The falling price of disks and higher capacities has now made it more economical to simply add disk space, rather than create a more expensive near online optical system. So, near online storage is absorbed into primary storage. All that remains is to back it up for archival purposes, and tape technology can easily handle that.

### WHY USE TAPE BACKUP WITH RAID?

Virtually every organization needs backup. Confusion over whether a RAID system replaces a tape backup system can have disastrous results. The required investment in a tape backup system makes it an inexpensive insurance policy.

RAID technology was developed primarily as a means to improve availability and increase disk performance, not as a backup system. The priorities of a RAID system are to view a set of disk drives as a single, logical drive; and secondarily to provide redundant capacity and components to facilitate recovery in the event of failure.

While RAID is an excellent solution to enhance productivity and protect data in mission critical applications, it is fallible as a backup system. RAID Level 0 is inappropriate for backup — with an estimated expected life span of one disk divided by the number of disks combined together. If two components fail, the stored data may be unrecoverable. Further, true backups are a means to take snapshots of data at a point in time. For example, to preserve accounting data for audits or to catalog engineering log levels at specific intervals. The redundancy of a RAID device is not a snapshot. Rather, the data on the redundant disks is dynamic. [Editor's note: see sidebar for changes in RAID technology]

### THE DOMINANCE OF TAPE

Once thought to be a technology that had seen its last days, tape technology has instead continued to flourish. Tape is still



## RAID'S RENEWED MISSION

Since its inception in 1986, RAID has undergone significant transformations. Advancements in disk drive technology and changing market requirements have changed the definition as well as the application of RAID storage systems.

The 1986 definition of RAID was Redundant Array Of Inexpensive Drives. At that time, RAID had significant benefits over the Single Large Expensive Drive (or SLED). Redundancy was not a major consideration when evaluating RAID storage solutions. The existing drive technology yielded drives with slow access performance and relatively small capacities. A 100 MB drive was expensive and considered very large. RAID allowed the use of many smaller, inexpensive drives to be configured as a single large drive. This provided significantly faster access times.

Today's disk drive technology produces 8 ms access, 9 GB single drives for as little as 35 cents per megabyte.

The application of RAID has been affected by

current data management tools that allow companies to more efficiently capture data. Improved data access tools facilitate efficient methods for accessing and presenting this data. In addition to the improvements in disk drives and data management tools, market demands also are having a profound impact on RAID products. As companies expand into global markets spanning multiple time zones, they require access to their data 24 hours a day, 7 days a week.

Advancements in disk technology and demand for data availability have driven the market to redefine RAID. Today, RAID stands for Redundant Array of Independent Disks. The cost of data downtime and data recovery time (if it is, indeed, recoverable) has become prohibitively expensive. Redundancy has become the single most important benefit of RAID storage solutions. Redundancy now includes every RAID element including drives, controllers, power supplies, host connections, cooling fans and

power sources. High availability demands that failed subsystems can be replaced without bringing the storage system offline (hot swaps) or can be replaced automatically (hot spares).

These technological and market factors have changed the benefits of RAID from, in order of importance, cost-performance-reliability to reliability-performance-cost. In 1986, the RAID emphasis was to create a single large fast drive (with some redundancy) out of many inexpensive small disks.

So when a few minutes of data unavailability costs thousands of dollars, or when your data is changing so rapidly that daily backups provide inadequate protection, only RAID can provide you that extra level of protection. —*Harry Banbury is sales & product marketing engineer, Mike Peebles is director of technology assessment and acceptance at IEM Inc. (Fort Collins, Colo.), a leading manufacturer of RAID and other storage products.*

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the least expensive (per gigabyte) form of backup on the market. Within the tape market, 4mm and 8mm still dominate. However, Digital Linear Tape (DLT) is challenging the status quo with its high capacity, robust nature and performance. Numerous DLT libraries that support from five cartridges up to hundreds are entering the market.

Prior to the emergence of 8mm tape, 150 MB quarter-inch cartridge (QIC) dominated the market. Now, increases in the 5.25-inch QIC capacities promise to drive the cost per megabyte down, paving the way for a tremendous increase in shipments through 1998. The migration path from 13 GB media to 25 GB and eventually to 44 GB can offer price points as low as eight cents per MB. This continued evolution will allow QIC to survive, and open up a market dominated by 8mm to a diverse mix of offerings.

#### UNDERSTAND AND EVALUATE

In designing any storage system, the most effective strategy is to carefully consider available technologies in terms of the environment. Speed, seek times and expandability may be considerations for primary storage, leading to a choice of traditional hard disks. For mobile users, portability of media may be a concern. Longevity of media is still won by optical, with an estimated media life span of 20 years.

Backup is a significant component of any storage system.

For backup of mission critical data as well as daily correspondence, tape (with its wealth of autochanger options) appears to be the most efficient and reliable choice. Tape is getting faster — increased access times and capacity of up to 40 GB per tape are evidence that the technology is evolving to maintain its preeminence among a slew of new competitors. And companies with large amounts of history on tape must continue to maintain that investment.

A final consideration is marrying the hardware technology to appropriate software. In all cases, proper software support to manage the stored data is essential. In a backup system, the software simplifies the entire administration task — from scheduling of full or incremental backups, to archiving and retrieval support.—*Rik Mussman is vice president of Lighthouse Technology (Carlsbad, Calif.), a value-added reseller of HP and SPARC-based workstations, peripheral and storage products. Mussman has over 15 years of experience in the computer industry and specializes in storage peripherals.*

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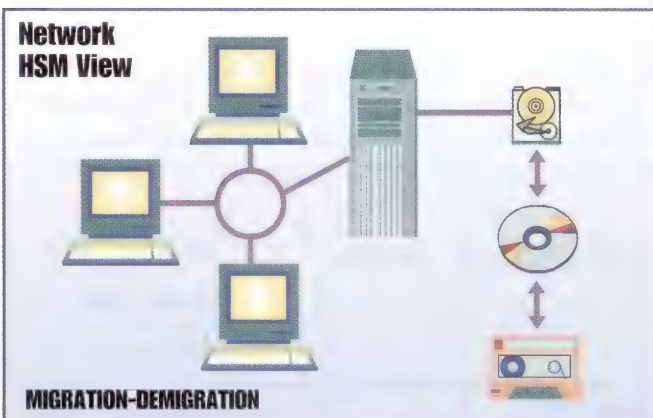
# A Solution Whose Time Has Come

John Stauderaus

Corporate LANs are experiencing explosive growth as companies rightsize computing environments and use LANs to link mainframes, midrange computers and PCs. Coupled to increasingly large data files, this strains storage and administrative capabilities to the limit. The quick fix — adding more and higher-capacity hard drives to network file servers—sometimes creates more problems than it solves.

Hierarchical Storage Management (HSM), a concept borrowed from the mainframe systems management world, applies the same rightsizing philosophy to file administration and storage.

And although HSM has been used for many years in the mainframe and UNIX environments to solve these problems, it is only recently that workable HSM solutions have been made available to the NetWare PC/LAN environment. HSM provides ready access to vast amounts of storage space, while sharply reducing the administrative costs involved in file management. As the name implies, HSM software moves files across a hierarchy of storage devices ranked in terms of storage capacity and retrieval speed. Files migrate to the slower-access, cheaper means of storage, based on rules tied to frequency of data access.



HSM automatically moves the older and infrequently accessed files from critical, fast-access hard drives to less expensive media such as rewritable optical and tape. An advantage of HSM is that storage and retrieval of files is transparent to users and applications because HSM manages this migration and recall automatically. HSM makes all hierarchical storage appear to users as a virtual extension of their server volumes and directories.

## MANAGEMENT COSTS WILL DRIVE HSM

While it is true that both the end user and reseller communities are today educated in the technical underpinnings of HSM, what still needs to be brought out is the true cost savings HSM provides. Originally software vendors touted HSM as a way of avoiding expensive magnetic media costs. Today, with the purchase price of magnetic media dropping to 50 cents per MB, this is no longer a reason to get HSM. Instead, users and resellers need to understand better the management savings that accompany an HSM implementation.

Server management is a manually-intensive function prone to high labor costs and errors. HSM automates these tasks, enabling the network administrator to focus on network performance rather than file migration. The management costs savings to be had with HSM include:

- Elimination of user time employed to manage allocated server disk space.
- Elimination of "Server Out of Disk Space" condition and associated loss of access.
- Improvement of server disk performance and application response time.
- Reduction in server downtime and loss of access to files on server data.
- Better data protection—backups are completed faster and more efficiently because they focus on the active file system.



- Fewer file corruption problems due to overfill and excessively fragmented server disks.
- Reduced disaster recovery time.

All of the above provide true cost savings, yet are not as quantifiable as the savings from less reliance on magnetic media. However, according to a Gartner Group Inc. labor constitutes 71 percent of the total cost of ownership (TCO) of such a system over five years. Technology costs, which include all client and server hardware, software, upgrades, maintenance and communications elements,

### Migration Rules - Watermarks

	95%	CRITICAL LEVEL	Watermarks are defined levels of storage device utilization
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represents only 21 percent of the total cost.

The network administrator no longer needs to identify inactive files, move them to other storage media, and maintain catalogs and backups to identify each file's location. In addition, because many files can be off-loaded from the primary server disk storage, the amount of time needed to backup mission-critical data on the server is reduced and disaster recovery time is shortened.

HSM software needs to work seamlessly with the backup software currently in use for the important reason that HSM files that are migrated to the second or third storage platform are automatically denigrated back to the network if the backup software is not integrated with the HSM solution. In effect, this can eliminate all of the benefits associated with HSM. In addition, backup-integrated HSM provides the ability to share hardware devices, SCSI boards, tape formats and job scheduling, while at the same time providing a built-in disaster recovery process.

HSM is just emerging from its early adopter phase and will now start to be implemented by users in earnest. As users become better informed about the true management cost savings provided by HSM and as backup integrated solutions become available, HSM will become a mainstream product. —John Staudenraus is HSM product manager at Cheyenne Software Inc. (Roslyn Heights, New York).

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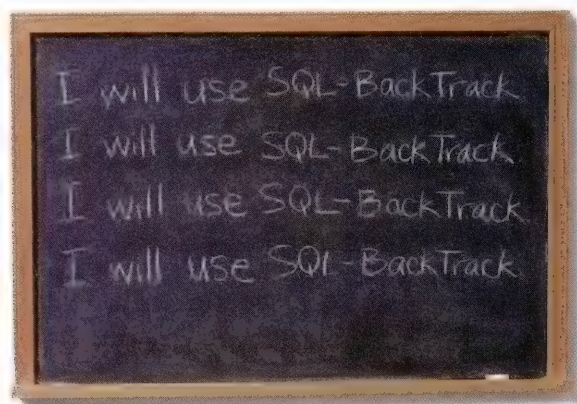
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## DISC Announces SMARTCD Support

DISC Inc. announced SMARTCD Ar-

chive and SMARTCD Library software support from Smart Storage Inc. for DISC's family of CD-ROM libraries. The SMARTCD Library brings jukebox libraries into the mainstream of standalone and network access to published CD-ROM collections. Two versions are available for network access; the PC Server version uses a dedicated machine, the NLM version connects directly to a Novell NetWare 3.1x or 4.x. SMARTCD Archive provides access to vast quantities of archival information

stored on CD-R discs. In addition to PC server and NLM versions, SMARTCD Archive is also available in versions for NFS Servers and Solaris.

DISC offers a high-end family of CD-ROM libraries ranging in capacity from 300 to more than 1,400 CD-ROM disks, providing storage for nearly a terabyte. DISC libraries support 4X-quadruple-speed and CD Recordable with up to 48 drives per library. Contact Smart Storage Inc., 100 Burrill Rd., Andover, MA 01810; (508)623-3300.

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## Storage Computer Develops RAID 7

Storage Computer introduced the RAID 7 Storage Server. RAID 7 increases system performance by eliminating I/O bottlenecks by offloading the host storage related overhead and RAID fault resiliency functions.

RAID 7 provides higher levels of protections for valuable data. It can recover from disk failures by automatically reconstructing the missing data on multiple hot standby drives.

There are three available models: Desktop (Dx), Rackmount (Rx) and Console (CLx) with slots for up to 48 SCSI drives in a single CLx configuration. With the addition of Expansion Chassis, up to 1.3 TB of storage can be achieved. 3.5- or 5.25-inch drives of any capacity, speed, from various manufacturers can be selected.

Contact Storage Computer Corp., 1 Riverside St., Nashua, NH 03062; (603) 889-7232.

Circle 379 on reader card

## EMASS Offers Automated Media Libraries

EMASS introduced Automated Media Libraries (AML). Any drives can be attached and any media can be stored in the AML to match the requirements of any data storage application. The AMLs support connectivity to all common mainframe and open system platforms.

The AML/2 is a full-function, mixed media storage solution offering a maximum storage capacity of 50,000 tape cartridges. It supports any tape media (IBM-style 3480/3490/3490E and 3590, as well as VHS, D2, DLT and 8mm) and 5.25-inch optical disks. The AML/2 accommodates the comprehensive family of drives from EMASS, as well as those from IBM, StorageTek, MountainGate (Metrum), Fujitsu, Memorex-Telex and others. Using D2 cartridges, AML/2 can store 1,000 TB of data. It can sustain 250 mount/dismount actions per hour, per robot. When configur-



ed with two robots, the AML/2 can deliver 480 mount/dismount actions per hour.

The AML/E has a maximum storage capacity of 11,520 tape cartridges. The robotic arm can sustain 300 mount/dismount actions per hour. The gripper handles tape cartridge and tape cassette media including 3480/3490/3490E, 3590, VHS, D2, DLT and 8mm. It also handles 5.25-inch optical disks. The AML/E is fully compatible with drives from EMASS as well as drives from other vendors.

The AML/J is a smaller scale Automated Media Library with the same powerful functionality as the larger libraries. It can be modularly expanded to store up to 4,500 tape cartridges. It offers a cost-effective mixed media/drive strategy.

Contact EMASS Inc., 2260 Merritt Dr., Garland, TX 75041; (214) 205-5665.

Circle 378 on reader card

## Young Minds Announces High Speed CD-ROM

Young Minds, Inc. (YMi) introduced a new CD-Recording system, named the Mass Production System (MPS), that premasters and records as many as 100 different CD-ROM discs in a day. The MPS system consists of the MPS multi-processor controller, the premastering software, a CD recorder and a media autoloader. The MPS controller is available with two, three or four premastering engines. An in-line disc label printer is optional.

The host system can be virtually any UNIX workstation. Once a set of data is premastered, the host sends the data to the MPS system, which then queues and sends it to the recorder.

The MPS system uses the Kodak PCD 600 CD Recorder. The PCD records at 900 KB/second. It takes only 12 minutes for the PCD 600 to record 650 MB of data onto a recordable disc.

A Kodak Disc Transporter connected to the PCD 600 loads blank discs as instructed by the MPS controller. The Disc Transporter allows users to stack up to 75 blank discs on an input spindle, and it loads discs one at a time to the CD Recorder. Once a disc is recorded, the Transporter moves the disc from the Recorder to an output spindle.

MPS is available for virtually every UNIX environment including HP-UX, Sun OS, AIX, DEC, UNIX, DG, UX, SGI, Solaris, SCO and UNIX Ware.

MPS pricing begins at \$69,950. Contact Young Minds Inc., 1910 Orange Tree Lane, Suite 300, Redlands, CA 92374; 1-800-964-4964

Circle 376 on reader card

## Newport Digital Announces Memory Upgrades

Newport Digital announced the following new products: a 128 MB memory module for the HP 9000 Series 700 Model C100 Desktop and the HP 9000 Series 700 Model C110 Desktop; a 128 MB memory module for the HP 3000 Models 9x9KS, HP 9000 Models Kx00 and Kx20, and the HP 9000 Models J2x0; and a 256 MB memory module for the HP 9000 Models 720, 730, 735, 750 and 755. The maxi-

mum memory for the 720 and 730 is 1 GB and the 735, 750 and 755 is 1.552 GB.

Newport Digital also introduced a 256 MB memory module for the HP 9000 Models Fxx, Gxx, Hxx and Lxx with the maximum memory of 1.920 GB. Also released was a 256 MB memory module for the HP 3000 Models 9x7 and HP 9000 Models 8x7 with the maximum memory of 1.920 GB.

Contact Newport Digital, 14731 Franklin Ave., Tustin, CA 92680; (714) 730-3644.

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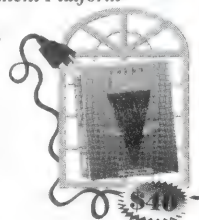
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- |                                 |                             |
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| 2. Types of Services Available  | 7. Support Personnel Skills |
| 3. Time Factor for Recovering   | 8. Work Space Availability  |
| 4. Computer Platforms Supported | 9. Testing Philosophy       |
| 5. Telecommunications           | 10. Data Backup Capability  |

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1. Flexibility of Recovery Solutions
2. Planning Assistance Provided
3. Contract Terms and Conditions
4. Fees and Charges

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(Fill out worksheet)

Activity	Day 1	Day 3	Day 7	Day 15
Lost Sales	\$ _____	\$ _____	\$ _____	\$ _____
Lost Revenues (fees, collections)	\$ _____	\$ _____	\$ _____	\$ _____
Loss of Customer/ Future Business	\$ _____	\$ _____	\$ _____	\$ _____
Increased Expenses (lost discounts, additional personnel, temporary employees, overtime, data and records re-creation)	\$ _____	\$ _____	\$ _____	\$ _____
Fines & Penalties (regulatory agencies, unions, vendor contact obligation)	\$ _____	\$ _____	\$ _____	\$ _____
Adverse Publicity (legal ramifications, management liability, stockholders, customers)	\$ _____	\$ _____	\$ _____	\$ _____
Total	\$ _____	\$ _____	\$ _____	\$ _____

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2:25 PM

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new language.

ER uppp ER uppp ER uppp ER up

2:26 PM

It's not Farsi or Urdu.

2:28 PM

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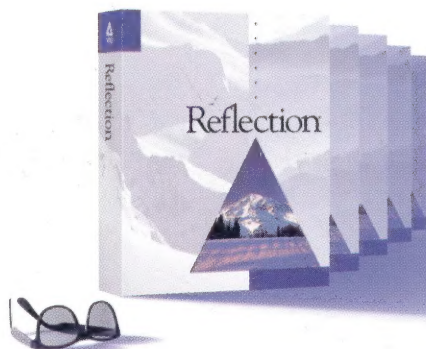
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